Event, Cause, and Quantum Memory Register—An Augmentation- Arrondissement Model

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Abstract—We study a consolidated system of event; cause and n Qubit register which makes computation with n Qubits. Model extensively dilates upon systemic properties and analyses the systemic behaviour of the equations together with other concomitant properties. Inclusion of event and cause, we feel enhances the “Quantum ness” of the system holistically and brings out a relevance in the Quantum Computation on par with the classical system, in so far as the analysis is concerned.*

I. Introduction

Event And Its Vindication:

There are definitely a sense of compunction, contrition, hesitation, regret, remorse, hesitation and reservation to the acknowledgement of the fact that there is a personal relation to what happens to oneself. Louis de Broglie said that the events have already happened and it shall disclose to the people based on their level of consciousness. So there is destiny to start with! Say I am undergoing some seemingly insurmountable problem, which has hurt my sensibilities, susceptibilities and sentimentalities that I refuse to accept that that event was waiting for me to happen. In fact this is the statement of stoic philosophy which is referred to almost as bookish or abstract. Wound is there; it had to happen to me. So I was wounded. Stoics tell us that the wound existed before me; I was born to embody it. It is the question of consummation, consolidation, concretization, consubstantiation, that of this, that creates an “event” in us; thus you have become a quasi cause for this wound. For instance, my feeling to become an actor made me to behave with such perfectionism everywhere, that people’s expectations rose and when I did not come up to them I fell; thus the ‘wound’ was waiting for me and ‘I’ was waiting for the wound! One fellow professor used to say like you are searching for ideas, ideas also searching for you. Thus the wound possesses in itself a nature which is “impersonal and preindividual” in character, beyond general and particular, the collective and the private. It is the question of becoming universalistic and holistic in your outlook. Unless this fate had not befell you, the grand design would not have taken place in its entire entirety. It had to happen. And the concomitant ramifications and pernicious or positive implications, Everything is in order because the fate befell you. It is not as if the wound had to get something that is best from me or that I am a chosen by God to face the event. As said earlier “the grand design” would have been altered. And it cannot alter. You got to play your part and go; there is just no other way. The legacy must go on. You shall be torch bearer and you shall hand over the torch to somebody. This is the name of the game in totalistic and holistic way.

When it comes to ethics, I would say it makes no sense if any obstreperous, obstreperous, ululations, longing for death” for that shall be apotheosis, a perpetual and progressive glorification of the will. What is an event? Or for that matter an ideal event? An event is something like an “action at a distance” which only supernatural power can. What is an event? Or for that matter an ideal event? An event is something like an “action at a distance” which only supernatural power can. When it comes to ethics, I would say it makes no sense if any obstreperous, obstreperous, ululations, longings for death” for that shall be apotheosis, a perpetual and progressive glorification of the will. Everything is in order because the fate befell you. It is not as if the wound had to get something that is best from me or that I am a chosen by God to face the event. As said earlier “the grand design” would have been altered. And it cannot alter. You got to play your part and go; there is just no other way. The legacy must go on. You shall be torch bearer and you shall hand over the torch to somebody. This is the name of the game in totalistic and holistic way.

Event And Singularities In Quantum Systems:

What is an event? Or for that matter an ideal event? An event is a singularity or rather a set of singularities or set of singular points characterizing a mathematical curve, a physical state of affairs, a psychological person or a moral person. Singularities are turning points and points of inflection: they are bottle necks, foyers and centers; they are points of fusion; condensation and boiling; points of tears and joy; sickness and health; hope and anxiety; they are so to say “sensitive” points; such singularities should not be confused or confounded, aggravated or exacerbated with personality of a system expressing itself; or the individuality and idiosyncrasies of a system which is designated with a proposition. They should also not be fused with the
generalizational concept or universalistic axiomatic predications and postulation alcovishness, or the dipsomaniac flagelolet dirge of a concept. Possible a concept could be signified by a figurative representation or a schematic configuration. "Singularity is essentially, pre individual, and has no personalized bias in it, or for that matter a prejudice or precircumspersion of a conceptual scheme. It is in this sense we can define a "singularity" as being neither affirmative nor non affirmative. It can be positive or negative; it can create or destroy. On the other hand it must be noted that singularity is different both in its thematic discursive from the run of the mill day to day musings and mundane drooling. They are in that sense "extra-ordinary".

Each singularity is a source and resource, the origin, reason and raison d’être of a mathematical series, it could be any series any type, and that is interpolated or extrapolated to the structural location of the destination of another singularity. This according to this standpoint, there are different. It can be positive or negative; it can create or destroy. On the other hand it must be noted that singularity is different both in its thematic discursive from the run of the mill day to day musings and mundane drooling. There are in that sense "extra-ordinary".

This according to the widely held standpoint, there are different, multifarious, myriad, series IN A structure. In the eventuality of the fact that we conduct an unbiased and prudent examination of the series belonging to different "singularities" we can come to indubitable conclusions that the "singularity" of one system is different from the "other system" in the subterranean realm and ceratoid dualism of comparison and contrast EPR experiment derived that there exists a communications between two particles. We go a further step to say that there exists a channel of communication however slovenly, inept, clumsy, between the two singularities. It is also possible the communication exchange could be one of belligerence, cantankerousness, tempestuousness, astutely truculent, with ensorcelled frenzy. That does not matter. All we are telling is that singularities communicate with each other.

Now, how do find the reaction of systems to these singularities. You do the same thing a boss does for you. "Problematize" the events and see how you behave. I will resort to "pressure tactics". “intimidation of derridng report”, or “cut in the increment” to make you undergo trials, travails and tribulations. I am happy to see if you improve your work; but may or may not be sad if you succumb to it and hang yourself! We do the same thing with systems. systems show conducive response, felicitous reciprocation or behave erratically with inner roil, eponymous radicalism without and with blitzy conviction say like a solipsist nature of bellicose and blustering particles, or for that matter incendiaries in gormandizing fellow elementary particles, abnormal ebulitions, or "inside traders" they will not put signature at all! How do you find they did it! Anyway, there are possibilities of the nonexistence of ordinary. on the other hand it must be noted that singularity is different both in its thematic discursive from the run of the mill day to day musings and mundane drooling. This according to the widely held standpoint, there are different, multifarious, myriad, series IN A structure. In the eventuality of the fact that we conduct an unbiased and prudent examination of the series belonging to different "singularities" we can come to indubitable conclusions that the "singularity" of one system is different from the "other system" in the subterranean realm and ceratoid dualism of comparison and contrast.

Conservation Laws:
Conservation laws bears ample testimony, infallible observatory, and impeccable demonstration to the fact that the essential predications, character constitutions, ontological consonances remain unchanged with evolution despite the system’s astute truculence, serenading whimsicality, assymetric disposition or on the other hand anachronistic dispensation, eponymous radicality, entropic entrepotishness or the subdued, relationally contributive, diverse parametrizational, conducive reciprocity to environment, unconventional behaviour, euneletic nonlinear frenetic ness, ensorcelled frenzy, abnormal ebulliations, surcharged fulminations, or the inner roil. And that holds well with the evolution with time. We present a model of the generalizational conservation of the theories. A theory of all the conservation theories. That all conservation laws hold and there is no relationship between them is bête noir. We shall on this premise build a 36 storey model that deliberates on various issues, structural, dependent, thematic and discursive.
Note THAT The classification is executed on systemic properties and parameters. And everything that is known to us measurable. We do not know "intangible". Nor we accept or acknowledge that. All laws of conservation must hold. Hence the holistic laws must hold. Towards that end, interrelationships must exist. All science like law wants evidence and here we shall provide one under the premise that for all conservations laws to hold each must be interrelated to the other, lest the very conception is a fricative contretemps. And we live in “Measurement” world.

**Quantum Register:**

Devices that **harness and explore** the fundamental axiomatic predications of Physics has wide ranging amplitudinal **ramification** with its essence of locus and focus on information processing that outperforms their classical counterparts, and for unconditionally secure communication. However, in particular, implementations **based on** condensed-matter systems face the challenge of short coherence times. Carbon materials, particularly diamond, however, are suitable for **hosting** robust solid-state quantum registers, **owing to** their spin-free lattice and weak spin–orbit **coupling**. Studies with the structurally notched criticism and schizoid fragments of manifestations of historical perspective of diamond hosting quantum register have borne ample testimony and, and at differential and determinate levels have articulated the generalized significations and manifestations of quantum logic elements can be **realized** by exploring long-range magnetic dipolar coupling between individually addressable single electron spins associated with separate colour centres in diamond. The strong distance dependence of this coupling was used to characterize the separation of single qubits (98±3 Å) with accuracy close to the value of the crystal-lattice spacing. Coherent **control over** electron spins, conditional dynamics, selective readout as well as switchable **interaction** should rip open glittering façade for a prosperous and scintillating irreducible affirmation of open the way towards a viable room-temperature solid-state quantum register. As both electron spins are optically **addressable**, this solid-state quantum device operating at ambient conditions provides a degree of **control** that is at present available only for a few systems at low temperature (See for instance P. Neumann, R. Kolesov, B. Naydenov, J. Bec R. Rempp, M. Steiner, V. Jacques, G. Balasubramanian, M. L. Markham, D. J. Twitchen, S. Pezzagna, J. Meijer, J. Twamley, F. Jelezko & J. Wrachtrup)*

**CAUSE AND EVENT:**

**MODULE NUMBERED ONE:**

**NOTATION:**
- $G_{13}$ : CATEGORY ONE OF CAUSE
- $G_{14}$ : CATEGORY TWO OF CAUSE
- $G_{15}$ : CATEGORY THREE OF CAUSE
- $T_{13}$ : CATEGORY ONE OF EVENT
- $T_{14}$ : CATEGORY TWO OF EVENT
- $T_{15}$ : CATEGORY THREE OF EVENT

**FIRST TWO CATEGORIES OF QUBITS COMPUTATION:**

**MODULE NUMBERED TWO:**

- $G_{16}$ : CATEGORY ONE OF FIRST SET OF QUBITS
- $G_{17}$ : CATEGORY TWO OF FIRST SET OF QUBITS
- $G_{18}$ : CATEGORY THREE OF FIRST SET OF QUBITS
- $T_{16}$ : CATEGORY ONE OF SECOND SET OF QUBITS
- $T_{17}$ : CATEGORY TWO OF SECOND SET OF QUBITS
- $T_{18}$ : CATEGORY THREE OF SECOND SET OF QUBITS

**THIRD SET OF QUBITS AND FOURTH SET OF QUBITS:**

**MODULE NUMBERED THREE:**

- $G_{20}$ : CATEGORY ONE OF THIRD SET OF QUBITS
- $G_{21}$ : CATEGORY TWO OF THIRD SET OF QUBITS
- $G_{22}$ : CATEGORY THREE OF THIRD SET OF QUBITS
- $T_{20}$ : CATEGORY ONE OF FOURTH SET OF QUBITS
- $T_{21}$ : CATEGORY TWO OF FOURTH SET OF QUBITS
- $T_{22}$ : CATEGORY THREE OF FOURTH SET OF QUBITS

**FIFTH SET OF QUBITS AND SIXTH SET OF QUBITS:**

**MODULE NUMBERED FOUR:**
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

\[ G_{24} \] : CATEGORY ONE OF FIFTH SET OF QUBITS
\[ G_{25} \] : CATEGORY TWO OF FIFTH SET OF QUBITS
\[ G_{26} \] : CATEGORY THREE OF FIFTH SET OF QUBITS
\[ T_{24} \] : CATEGORY ONE OF SIXTH SET OF QUBITS
\[ T_{25} \] : CATEGORY TWO OF SIXTH SET OF QUBITS
\[ T_{26} \] : CATEGORY THREE OF SIXTH SET OF QUBITS

SEVENTH SET OF QUBITS AND EIGHTH SET OF QUBITS:
MODULE NUMBERED FIVE:
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\[ G_{28} \] : CATEGORY ONE OF SEVENTH SET OF QUBITS
\[ G_{29} \] : CATEGORY TWO OF SEVENTH SET OF QUBITS
\[ G_{30} \] : CATEGORY THREE OF SEVENTH SET OF QUBITS
\[ T_{28} \] : CATEGORY ONE OF EIGHTH SET OF QUBITS
\[ T_{29} \] : CATEGORY TWO OF EIGHTH SET OF QUBITS
\[ T_{30} \] : CATEGORY THREE OF EIGHTH SET OF QUBITS

\[ (n-1)\text{TH SET OF QUBITS AND nTH SET OF QUBITS} \]
MODULE NUMBERED SIX:
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\[ G_{32} \] : CATEGORY ONE OF (n-1)TH SET OF QUBITS
\[ G_{33} \] : CATEGORY TWO OF (n-1)TH SET OF QUBITS
\[ G_{34} \] : CATEGORY THREE OF (N-1)TH SET OF QUBITS
\[ T_{32} \] : CATEGORY ONE OF nTH SET OF QUBITS
\[ T_{33} \] : CATEGORY TWO OF nTH SET OF QUBITS
\[ T_{34} \] : CATEGORY THREE OF nTH SET OF QUBITS

\[ \{a_{13}\}(1), \{a_{14}\}(1), \{a_{15}\}(1), \{b_{13}\}(1), \{b_{14}\}(1), \{b_{15}\}(1), \{a_{16}\}(2), \{a_{17}\}(2), \{a_{18}\}(2), \{b_{16}\}(2), \{b_{17}\}(2), \{b_{18}\}(2), \{a_{20}\}(3), \{a_{21}\}(3), \{a_{22}\}(3), \{b_{20}\}(3), \{b_{21}\}(3), \{b_{22}\}(3), \{a_{24}\}(4), \{a_{25}\}(4), \{a_{26}\}(4), \{b_{24}\}(4), \{b_{25}\}(4), \{b_{26}\}(4), \{b_{28}\}(5), \{b_{29}\}(5), \{b_{30}\}(5), \{a_{28}\}(5), \{a_{29}\}(5), \{a_{30}\}(5), \{a_{32}\}(6), \{a_{33}\}(6), \{a_{34}\}(6), \{b_{32}\}(6), \{b_{33}\}(6), \{b_{34}\}(6) \]
are Accentuation coefficients
\[ \{a_{13}'\}(1), \{a_{14}'\}(1), \{a_{15}'\}(1), \{b_{13}'\}(1), \{b_{14}'\}(1), \{b_{15}'\}(1), \{a_{16}'\}(2), \{a_{17}'\}(2), \{a_{18}'\}(2), \{b_{16}'\}(2), \{b_{17}'\}(2), \{b_{18}'\}(2), \{a_{20}'\}(3), \{a_{21}'\}(3), \{a_{22}'\}(3), \{b_{20}'\}(3), \{b_{21}'\}(3), \{b_{22}'\}(3), \{a_{24}'\}(4), \{a_{25}'\}(4), \{a_{26}'\}(4), \{b_{24}'\}(4), \{b_{25}'\}(4), \{b_{26}'\}(4), \{b_{28}'\}(5), \{b_{29}'\}(5), \{b_{30}'\}(5), \{a_{28}'\}(5), \{a_{29}'\}(5), \{a_{30}'\}(5), \{a_{32}'\}(6), \{a_{33}'\}(6), \{a_{34}'\}(6), \{b_{32}'\}(6), \{b_{33}'\}(6), \{b_{34}'\}(6) \]
are Dissipation coefficients

CAUSE AND EVENT:
MODULE NUMBERED ONE

The differential system of this model is now (Module Numbered one)*1
\[
\frac{d}{dt} G_{14} = (a_{13})^{(1)} G_{14} - \left(\{a_{13}\}(1) + (a_{13})^{(1)} T_{14,t}\right) G_{15} \quad *2
\]
\[
\frac{d}{dt} G_{14} = (a_{14})^{(1)} G_{13} - \left(\{a_{14}\}(1) + (a_{14})^{(1)} T_{14,t}\right) G_{14} \quad *3
\]
\[
\frac{d}{dt} G_{15} = (a_{13})^{(1)} G_{14} - \left(\{a_{15}\}(1) + (a_{15})^{(1)} T_{14,t}\right) G_{15} \quad *4
\]
\[
\frac{d}{dt} T_{14} = (b_{13})^{(1)} T_{14} - \left(\{b_{13}\}(1) - (b_{13})^{(1)} G,t\right) T_{15} \quad *5
\]
\[
\frac{d}{dt} T_{14} = (b_{14})^{(1)} T_{13} - \left(\{b_{14}\}(1) - (b_{14})^{(1)} G,t\right) T_{14} \quad *6
\]
\[
\frac{d}{dt} T_{15} = (b_{13})^{(1)} T_{14} - \left(\{b_{15}\}'(1) - (b_{15})^{(1)} G,t\right) T_{15} \quad *7
\]
\[
+(a_{13})^{(1)} (T_{14,t}) = \text{First augmentation factor} \quad *8
\]
\[
-(b_{13})^{(1)} (G,t) = \text{First detritons factor} \quad *9
\]

FIRST TWO CATEGORIES OF QUBITS COMPUTATION:

MODULE NUMBERED TWO:

The differential system of this model is now (Module Numbered two)*9
\[
\frac{d}{dt} G_{16} = (a_{16})^{(2)} G_{17} - \left(\{a_{16}'\}(2) + (a_{16})^{(2)} T_{17,t}\right) G_{16} \quad *10
\]
\[
\frac{d}{dt} G_{17} = (a_{17})^{(2)} G_{16} - \left(\{a_{17}\}'(2) + (a_{17})^{(2)} T_{17,t}\right) G_{17} \quad *11
\]
\[
\frac{d}{dt} G_{18} = (a_{18})^{(2)} G_{17} - \left(\{a_{18}'\}(2) + (a_{18})^{(2)} T_{17,t}\right) G_{18} \quad *12
\]

68
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

\[ \frac{dT_{16}}{dt} = (b_{16})^{(2)}T_{17} - \left[ (b_{16})^{(2)} - (b_{18})^{(2)}(G_{19}, t) \right]T_{16} \]
\[ \frac{dT_{17}}{dt} = (b_{17})^{(2)}T_{16} - \left[ (b_{17})^{(2)} - (b_{19})^{(2)}(G_{19}, t) \right]T_{17} \]
\[ \frac{dT_{18}}{dt} = (b_{18})^{(2)}T_{17} - \left[ (b_{18})^{(2)} - (b_{19})^{(2)}(G_{19}, t) \right]T_{18} \]
\[ \left( a_{16}^{(2)} \right)(T_{17}, t) = \text{First augmentation factor} \]
\[ \left( b_{16}^{(2)} \right)(G_{19}, t) = \text{First detritions factor} \]

**THIRD SET OF QUBITS AND FOURTH SET OF QUBITS: MODULE NUMBERED THREE**

The differential system of this model is now (Module numbered three)

\[ \frac{dT_{20}}{dt} = (a_{20})^{(3)}G_{21} - \left[ (a_{20})^{(3)} + (a_{20}^{*})^{(3)}(T_{21}, t) \right]G_{20} \]
\[ \frac{dT_{21}}{dt} = (a_{21})^{(3)}G_{21} - \left[ (a_{21})^{(3)} + (a_{21}^{*})^{(3)}(T_{21}, t) \right]G_{21} \]
\[ \frac{dT_{22}}{dt} = (a_{22})^{(3)}G_{21} - \left[ (a_{22})^{(3)} + (a_{22}^{*})^{(3)}(T_{21}, t) \right]G_{22} \]
\[ \frac{dT_{23}}{dt} = (b_{23})^{(3)}T_{21} - \left[ (b_{23})^{(3)} - (b_{23}^{*})^{(3)}(G_{23}, t) \right]T_{23} \]
\[ \frac{dT_{24}}{dt} = (b_{24})^{(3)}T_{23} - \left[ (b_{24})^{(3)} - (b_{24}^{*})^{(3)}(G_{23}, t) \right]T_{24} \]
\[ \left( a_{20}^{(3)} \right)(T_{23}, t) = \text{First augmentation factor} \]
\[ \left( b_{20}^{(3)} \right)(G_{23}, t) = \text{First detritions factor} \]

**FIFTH SET OF QUBITS AND SIXTH SET OF QUBITS: MODULE NUMBERED FOUR**

The differential system of this model is now (Module numbered Four)

\[ \frac{dT_{25}}{dt} = (a_{25})^{(4)}G_{25} - \left[ (a_{25})^{(4)} + (a_{25}^{*})^{(4)}(T_{25}, t) \right]G_{25} \]
\[ \frac{dT_{26}}{dt} = (a_{26})^{(4)}G_{25} - \left[ (a_{26})^{(4)} + (a_{26}^{*})^{(4)}(T_{25}, t) \right]G_{26} \]
\[ \frac{dT_{27}}{dt} = (a_{27})^{(4)}G_{25} - \left[ (a_{27})^{(4)} + (a_{27}^{*})^{(4)}(T_{25}, t) \right]G_{27} \]
\[ \frac{dT_{28}}{dt} = (b_{28})^{(4)}T_{25} - \left[ (b_{28})^{(4)} - (b_{28}^{*})^{(4)}(G_{28}, t) \right]T_{25} \]
\[ \frac{dT_{29}}{dt} = (b_{29})^{(4)}T_{25} - \left[ (b_{29})^{(4)} - (b_{29}^{*})^{(4)}(G_{28}, t) \right]T_{26} \]
\[ \left( a_{25}^{(4)} \right)(T_{25}, t) = \text{First augmentation factor} \]
\[ \left( b_{25}^{(4)} \right)((G_{27}, t) = \text{First detritions factor} \]

**SEVENTH SET OF QUBITS AND EIGHTH SET OF QUBITS: MODULE NUMBERED FIVE**

The differential system of this model is now (Module numbered Five)

\[ \frac{dT_{30}}{dt} = (a_{30})^{(5)}G_{29} - \left[ (a_{30})^{(5)} + (a_{30}^{*})^{(5)}(T_{29}, t) \right]G_{30} \]
\[ \frac{dT_{31}}{dt} = (a_{31})^{(5)}G_{29} - \left[ (a_{31})^{(5)} + (a_{31}^{*})^{(5)}(T_{29}, t) \right]G_{31} \]
\[ \frac{dT_{32}}{dt} = (a_{32})^{(5)}G_{29} - \left[ (a_{32})^{(5)} + (a_{32}^{*})^{(5)}(T_{29}, t) \right]G_{32} \]
\[ \frac{dT_{33}}{dt} = (b_{33})^{(5)}T_{29} - \left[ (b_{33})^{(5)} - (b_{33}^{*})^{(5)}(G_{33}, t) \right]T_{33} \]
\[ \frac{dT_{34}}{dt} = (b_{34})^{(5)}T_{29} - \left[ (b_{34})^{(5)} - (b_{34}^{*})^{(5)}(G_{33}, t) \right]T_{34} \]
\[ \left( a_{30}^{(5)} \right)(G_{33}, t) = \text{First augmentation factor} \]
\[ \left( b_{30}^{(5)} \right)((G_{33}, t) = \text{First detritions factor} \]

**n-1)TH SET OF QUBITS AND nTH SET OF QUBITS: MODULE NUMBERED SIX**

The differential system of this model is now (Module numbered Six)

\[ \frac{dT_{35}}{dt} = (a_{35})^{(6)}G_{32} - \left[ (a_{35})^{(6)} + (a_{35}^{*})^{(6)}(T_{33}, t) \right]G_{35} \]
\[ \frac{dT_{36}}{dt} = (a_{36})^{(6)}G_{32} - \left[ (a_{36})^{(6)} + (a_{36}^{*})^{(6)}(T_{33}, t) \right]G_{36} \]
\[ \frac{dT_{37}}{dt} = (a_{37})^{(6)}G_{32} - \left[ (a_{37})^{(6)} + (a_{37}^{*})^{(6)}(T_{33}, t) \right]G_{37} \]
\[ \frac{dT_{38}}{dt} = (b_{38})^{(6)}T_{33} - \left[ (b_{38})^{(6)} - (b_{38}^{*})^{(6)}(G_{35}, t) \right]T_{38} \]
\[ \frac{dT_{39}}{dt} = (b_{39})^{(6)}T_{33} - \left[ (b_{39})^{(6)} - (b_{39}^{*})^{(6)}(G_{35}, t) \right]T_{39} \]

69
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

\[ \frac{dT_{13}}{dt} = (b_{13})^{(1)}T_{13} - \left[ (b_{13})^{(6)} - (b_{13})^{(6)}((G_{33}, t)) \right]T_{33} \quad \text{**50} \]

\[ \frac{dT_{34}}{dt} = (b_{34})^{(6)}T_{34} - \left[ (b_{34})^{(6)} - (b_{34})^{(6)}((G_{33}, t)) \right]T_{33} \quad \text{**51} \]

\[ + (a_{12})^{(6)}(T_{34}, t) = \text{First augmentation factor}^{**52} \]

\[ - (b_{32})^{(6)}((G_{33}, t)) = \text{First detrition factor} \quad \text{**53} \]

**HOLISTIC CONCATENATE SYSTEMAL EQUATIONS HENCEFOROHER REFEREED AS “GLOBAL EQUATIONS”**

(1) EVENT AND CAUSE

(2) FIRST SET OF QUBITS AND SECOND SET OF QUBITS

(3) THIRD SET OF QUBITS AND FOURTH SET OF QUBITS

(4) FIFTH SET OF QUBITS AND SIXTH SET OF QUBITS

(5) SEVENTH SET OF QUBITS AND EIGHTH SET OF QUBITS

(6) (n-1)TH SET OF QUBITS AND nTH QUBIT

\[ \frac{dG_{13}}{dt} = (a_{13})^{(1)}G_{14} - \left[ (a_{13})^{(1)}(T_{14}, t) \right] \quad \text{G}_{13} \quad \text{**55} \]

\[ \frac{dG_{14}}{dt} = (a_{14})^{(1)}G_{13} - \left[ (a_{14})^{(1)}(T_{14}, t) \right] \quad \text{G}_{14} \quad \text{**56} \]

\[ \frac{dG_{15}}{dt} = (a_{15})^{(1)}G_{14} - \left[ (a_{15})^{(1)}(T_{14}, t) \right] \quad \text{G}_{15} \quad \text{**57} \]

Where \((a_{13})^{(1)}(T_{14}, t), (a_{14})^{(1)}(T_{14}, t), (a_{15})^{(1)}(T_{14}, t)\) are first augmentation coefficients for category 1, 2 and 3.

\[ + (a_{16})^{(2,2)}(T_{17}, t) \quad + (a_{17})^{(2,2)}(T_{17}, t) \quad + (a_{18})^{(2,2)}(T_{17}, t) \]

\[ + (a_{20})^{(3,3)}(T_{21}, t) \quad + (a_{21})^{(3,3)}(T_{21}, t) \quad + (a_{22})^{(3,3)}(T_{21}, t) \]

\[ + (a_{24})^{(4,4,4)}(T_{25}, t) \quad + (a_{25})^{(4,4,4)}(T_{25}, t) \quad + (a_{26})^{(4,4,4)}(T_{25}, t) \]

\[ + (a_{28})^{(5,5,5,5)}(T_{29}, t) \quad + (a_{29})^{(5,5,5,5)}(T_{29}, t) \quad + (a_{30})^{(5,5,5,5)}(T_{29}, t) \]

\[ + (a_{32})^{(6,6,6,6)}(T_{33}, t) \quad + (a_{33})^{(6,6,6,6)}(T_{33}, t) \quad + (a_{34})^{(6,6,6,6)}(T_{33}, t) \]

Where \(- (b_{13})^{(1)}(G,t), - (b_{14})^{(1)}(G,t), - (b_{15})^{(1)}(G,t)\) are first detrition coefficients for category 1, 2 and 3.

\[ \frac{dT_{13}}{dt} = (b_{13})^{(1)}T_{13} - \left[ (b_{13})^{(1)}(G,t) \right] \quad T_{13} \quad \text{**61} \]

\[ \frac{dT_{14}}{dt} = (b_{14})^{(1)}T_{14} - \left[ (b_{14})^{(1)}(G,t) \right] \quad T_{14} \quad \text{**62} \]

\[ \frac{dT_{15}}{dt} = (b_{15})^{(1)}T_{15} - \left[ (b_{15})^{(1)}(G,t) \right] \quad T_{15} \quad \text{**63} \]

Where \(- (b_{13})^{(1)}(G,t), - (b_{14})^{(1)}(G,t), - (b_{15})^{(1)}(G,t)\) are first detrition coefficients for category 1, 2 and 3.
Event, Cause, and Quantum Memory Register–An Augmentation-Arrondissement Model

\[
\begin{align*}
-(b_{16}^{(2,2,2)}(G_{19}, t), -(b_{17}^{(2,2,2)}(G_{19}, t), -(b_{18}^{(2,2,2)}(G_{19}, t), \text{ are second detrition coefficients for category 1, 2 and 3} \\
-(b_{20}^{(3,3,3)}(G_{23}, t), -(b_{21}^{(3,3,3)}(G_{23}, t), -(b_{22}^{(3,3,3)}(G_{23}, t), \text{ are third detrition coefficients for category 1, 2 and 3} \\
-(b_{24}^{(4,4,4,4)}(G_{27}, t), -(b_{25}^{(4,4,4,4)}(G_{27}, t), -(b_{26}^{(4,4,4,4)}(G_{27}, t), \text{ are fourth detrition coefficients for category 1, 2 and 3} \\
-(b_{32}^{(5,5,5,5)}(G_{33}, t), -(b_{33}^{(5,5,5,5)}(G_{33}, t), -(b_{34}^{(5,5,5,5)}(G_{33}, t), \text{ are fifth detrition coefficients for category 1, 2 and 3} \\
-(b_{35}^{(6,6,6,6)}(G_{35}, t), -(b_{36}^{(6,6,6,6)}(G_{35}, t), -(b_{37}^{(6,6,6,6)}(G_{35}, t), \text{ are sixth detrition coefficients for category 1, 2 and 3} \\

\frac{dg_{16}}{dt} = (a_{16}^{(2)}(G_{17} - (a_{16}^{(2)} + (a_{16}^{(2)}(T_{17}, r) + (a_{13}^{(1,1)}(T_{14}, t), + (a_{20}^{(3,3,3)}(T_{21}, t) } + (a_{23}^{(4,4,4,4)}(T_{25}, t) + (a_{25}^{(5,5,5,5)}(T_{29}, t) + (a_{32}^{(6,6,6,6)}(T_{33}, t) ] 
\end{align*}
\]

\[
\begin{align*}
\frac{dg_{17}}{dt} = (a_{17}^{(2)}(G_{16} - (a_{17}^{(2)} + (a_{17}^{(2)}(T_{17}, r) + (a_{14}^{(1,1)}(T_{16}, t) + (a_{21}^{(3,3,3)}(T_{21}, t) } + (a_{25}^{(4,4,4,4)}(T_{25}, t) + (a_{29}^{(5,5,5,5)}(T_{29}, t) + (a_{33}^{(6,6,6,6)}(T_{33}, t) ]
\end{align*}
\]

\[
\begin{align*}
\frac{dg_{18}}{dt} = (a_{18}^{(2)}(G_{17} - (a_{18}^{(2)} + (a_{18}^{(2)}(T_{17}, r) + (a_{15}^{(1,1)}(T_{16}, t) + (a_{22}^{(3,3,3)}(T_{21}, t) } + (a_{26}^{(4,4,4,4)}(T_{25}, t) + (a_{30}^{(5,5,5,5)}(T_{29}, t) + (a_{34}^{(6,6,6,6)}(T_{33}, t) ]
\end{align*}
\]

Where \( + (a_{16}^{(2)}(T_{17}, t), + (a_{17}^{(2)}(T_{17}, t), + (a_{18}^{(2)}(T_{17}, t) \) are first augmentation coefficients for category 1, 2 and 3

\[
\begin{align*}
+(a_{13}^{(1,1)}(T_{14}, t), + (a_{14}^{(1,1)}(T_{14}, t), + (a_{15}^{(1,1)}(T_{14}, t) \text{ are second augmentation coefficient for category 1, 2 and 3} \\
+(a_{20}^{(3,3,3)}(T_{21}, t), + (a_{21}^{(3,3,3)}(T_{21}, t), + (a_{22}^{(3,3,3)}(T_{21}, t) \text{ are third augmentation coefficient for category 1, 2 and 3} \\
+(a_{24}^{(4,4,4,4)}(T_{25}, t), + (a_{25}^{(4,4,4,4)}(T_{25}, t), + (a_{26}^{(4,4,4,4)}(T_{25}, t) \text{ are fourth augmentation coefficient for category 1, 2 and 3} \\
+(a_{32}^{(5,5,5,5)}(T_{33}, t), + (a_{33}^{(5,5,5,5)}(T_{33}, t), + (a_{34}^{(5,5,5,5)}(T_{33}, t) \text{ are fifth augmentation coefficient for category 1, 2 and 3} \\
+(a_{35}^{(6,6,6,6)}(T_{33}, t), + (a_{36}^{(6,6,6,6)}(T_{33}, t), + (a_{37}^{(6,6,6,6)}(T_{33}, t) \text{ are sixth augmentation coefficient for category 1, 2 and 3}
\end{align*}
\]

\[
\begin{align*}
\frac{dt_{16}}{dt} = (b_{16}^{(2)}(T_{17} - (b_{16}^{(2)}(G_{19}, t) - (b_{17}^{(2)}(G_{19}, t) - (b_{18}^{(2)}(G_{19}, t) \text{ are second detrition coefficients for category 1, 2 and 3} \\
-(b_{24}^{(4,4,4,4)}(G_{27}, t) - (b_{25}^{(4,4,4,4)}(G_{27}, t) - (b_{26}^{(5,5,5,5)}(G_{33}, t) \text{ are third detrition coefficients for category 1, 2 and 3} \\
-(b_{32}^{(5,5,5,5)}(G_{33}, t) - (b_{33}^{(5,5,5,5)}(G_{33}, t) - (b_{34}^{(5,5,5,5)}(G_{33}, t) \text{ are fourth detrition coefficients for category 1, 2 and 3} \\
-(b_{35}^{(6,6,6,6)}(G_{33}, t) - (b_{36}^{(6,6,6,6)}(G_{33}, t) - (b_{37}^{(6,6,6,6)}(G_{33}, t) \text{ are fifth detrition coefficients for category 1, 2 and 3}
\end{align*}
\]

\[
\begin{align*}
\frac{dt_{17}}{dt} = (b_{17}^{(2)}(T_{16} - (b_{17}^{(2)}(G_{19}, t) - (b_{18}^{(2)}(G_{19}, t) - (b_{21}^{(2)}(G_{19}, t) \text{ are second detrition coefficients for category 1, 2 and 3} \\
-(b_{25}^{(4,4,4,4)}(G_{27}, t) - (b_{26}^{(5,5,5,5)}(G_{33}, t) - (b_{32}^{(5,5,5,5)}(G_{33}, t) \text{ are third detrition coefficients for category 1, 2 and 3} \\
-(b_{33}^{(5,5,5,5)}(G_{33}, t) - (b_{34}^{(5,5,5,5)}(G_{33}, t) - (b_{35}^{(5,5,5,5)}(G_{33}, t) \text{ are fourth detrition coefficients for category 1, 2 and 3} \\
-(b_{36}^{(6,6,6,6)}(G_{33}, t) - (b_{37}^{(6,6,6,6)}(G_{33}, t) - (b_{38}^{(6,6,6,6)}(G_{33}, t) \text{ are fifth detrition coefficients for category 1, 2 and 3}
\end{align*}
\]

\[
\begin{align*}
\frac{dt_{18}}{dt} = (b_{18}^{(2)}(T_{17} - (b_{18}^{(2)}(G_{19}, t) - (b_{19}^{(2)}(G_{19}, t) - (b_{22}^{(2)}(G_{19}, t) \text{ are second detrition coefficients for category 1, 2 and 3} \\
-(b_{26}^{(4,4,4,4)}(G_{27}, t) - (b_{27}^{(5,5,5,5)}(G_{33}, t) - (b_{34}^{(5,5,5,5)}(G_{33}, t) \text{ are third detrition coefficients for category 1, 2 and 3} \\
-(b_{35}^{(5,5,5,5)}(G_{33}, t) - (b_{36}^{(5,5,5,5)}(G_{33}, t) - (b_{37}^{(5,5,5,5)}(G_{33}, t) \text{ are fourth detrition coefficients for category 1, 2 and 3}
\end{align*}
\]
where \(-\langle b_{1s}\rangle^{(2)}(G_{1s},t)\), \(-\langle b_{1s}\rangle^{(2)}(G_{1v},t)\), \(-\langle b_{1s}\rangle^{(2)}(G_{1s},t)\) are first detriment coefficients for categories 1, 2 and 3.

\(-\langle b_{1s}\rangle^{(1,1)}(G_{1s},t)\), \(-\langle b_{1s}\rangle^{(1,1)}(G_{1v},t)\), \(-\langle b_{1s}\rangle^{(1,1)}(G_{1s},t)\) are second detriment coefficients for categories 1, 2 and 3.

\(-\langle b_{1s}\rangle^{(3,3,3)}(G_{2s},t)\), \(-\langle b_{1s}\rangle^{(3,3,3)}(G_{2v},t)\), \(-\langle b_{1s}\rangle^{(3,3,3)}(G_{2s},t)\) are third detriment coefficients for categories 1, 2 and 3.

\(-\langle b_{2s}\rangle^{(4,4,4,4)}(G_{2s},t)\) \(-\langle b_{2s}\rangle^{(4,4,4,4)}(G_{2v},t)\) \(-\langle b_{2s}\rangle^{(4,4,4,4)}(G_{2s},t)\) are fourth detriment coefficients for categories 1, 2 and 3.

\(-\langle b_{3s}\rangle^{(5,5,5,5,5)}(G_{3s},t)\) \(-\langle b_{3s}\rangle^{(5,5,5,5,5)}(G_{3s},t)\) \(-\langle b_{3s}\rangle^{(5,5,5,5,5)}(G_{3s},t)\) are fifth detriment coefficients for categories 1, 2 and 3.

\(-\langle b_{3s}\rangle^{(6,6,6,6,6)}(G_{3s},t)\) \(-\langle b_{3s}\rangle^{(6,6,6,6,6)}(G_{3s},t)\) \(-\langle b_{3s}\rangle^{(6,6,6,6,6)}(G_{3s},t)\) are sixth detriment coefficients for categories 1, 2 and 3.

\(*75\)

\(\frac{dg_{20}}{dt} = (a_{20})^{(3)} G_{21} - \begin{bmatrix}
  (a_{20})^{(3)} + (a_{20})^{(3)}(T_{21}, t) & + (a_{20})^{(2,2,2)}(T_{17}, t) & + (a_{20})^{(1,1,1)}(T_{14}, t) \\
  + (a_{24})^{(4,4,4,4,4)}(T_{25}, t) & + (a_{28})^{(5,5,5,5,5)}(T_{29}, t) & + (a_{32})^{(6,6,6,6,6,6)}(T_{33}, t)
\end{bmatrix} G_{20} *76\)

\(\frac{dg_{21}}{dt} = (a_{21})^{(3)} G_{20} - \begin{bmatrix}
  (a_{21})^{(3)} + (a_{21})^{(3)}(T_{21}, t) & + (a_{21})^{(2,2,2)}(T_{17}, t) & + (a_{21})^{(1,1,1)}(T_{14}, t) \\
  + (a_{25})^{(4,4,4,4,4)}(T_{25}, t) & + (a_{29})^{(5,5,5,5,5)}(T_{29}, t) & + (a_{33})^{(6,6,6,6,6,6)}(T_{33}, t)
\end{bmatrix} G_{21} *77\)

\(\frac{dg_{22}}{dt} = (a_{22})^{(3)} G_{21} - \begin{bmatrix}
  (a_{22})^{(3)} + (a_{22})^{(3)}(T_{21}, t) & + (a_{22})^{(2,2,2)}(T_{17}, t) & + (a_{22})^{(1,1,1)}(T_{14}, t) \\
  + (a_{26})^{(4,4,4,4,4)}(T_{25}, t) & + (a_{30})^{(5,5,5,5,5)}(T_{29}, t) & + (a_{34})^{(6,6,6,6,6,6)}(T_{33}, t)
\end{bmatrix} G_{22} *78\)

\(+ (a_{20})^{(3)}(T_{21}, t)\) \(+ (a_{20})^{(3)}(T_{21}, t)\) \(+ (a_{20})^{(3)}(T_{21}, t)\) are first augmentation coefficients for categories 1, 2 and 3.

\(+ (a_{16})^{(2,2,2)}(T_{17}, t)\) \(+ (a_{17})^{(2,2,2)}(T_{17}, t)\) \(+ (a_{19})^{(2,2,2)}(T_{17}, t)\) are second augmentation coefficients for categories 1, 2 and 3.

\(+ (a_{13})^{(1,1,1)}(T_{14}, t)\) \(+ (a_{14})^{(1,1,1)}(T_{14}, t)\) \(+ (a_{15})^{(1,1,1)}(T_{14}, t)\) are third augmentation coefficients for categories 1, 2 and 3.

\(+ (a_{20})^{(4,4,4,4,4)}(T_{25}, t)\) \(+ (a_{24})^{(4,4,4,4,4)}(T_{25}, t)\) \(+ (a_{28})^{(4,4,4,4,4)}(T_{25}, t)\) are fourth augmentation coefficients for categories 1, 2 and 3.

\(+ (a_{20})^{(5,5,5,5,5)}(T_{29}, t)\) \(+ (a_{29})^{(5,5,5,5,5)}(T_{29}, t)\) \(+ (a_{33})^{(5,5,5,5,5)}(T_{29}, t)\) are fifth augmentation coefficients for categories 1, 2 and 3.

\(+ (a_{32})^{(6,6,6,6,6)}(T_{33}, t)\) \(+ (a_{33})^{(6,6,6,6,6)}(T_{33}, t)\) \(+ (a_{34})^{(6,6,6,6,6)}(T_{33}, t)\) are sixth augmentation coefficients for categories 1, 2 and 3.

\(*79\)

\(\frac{dy_{20}}{dt} = (b_{20})^{(3)} T_{21} - \begin{bmatrix}
  (b_{20})^{(3)}(G_{2s},t) & - (b_{20})^{(2,2,2)}(G_{1v},t) & - (b_{31})^{(1,1,1)}(G_{1s},t) \\
  - (b_{24})^{(4,4,4,4,4)}(G_{2s},t) & - (b_{28})^{(5,5,5,5,5)}(G_{3s},t) & - (b_{32})^{(6,6,6,6,6)}(G_{35},t)
\end{bmatrix} T_{20} *82\)

\(\frac{dy_{21}}{dt} = (b_{21})^{(3)} T_{20} - \begin{bmatrix}
  (b_{21})^{(3)}(G_{2s},t) & - (b_{21})^{(2,2,2)}(G_{1v},t) & - (b_{31})^{(1,1,1)}(G_{1s},t) \\
  - (b_{25})^{(4,4,4,4,4)}(G_{2s},t) & - (b_{29})^{(5,5,5,5,5)}(G_{3s},t) & - (b_{33})^{(6,6,6,6,6)}(G_{35},t)
\end{bmatrix} T_{21} *83\)
\[
\frac{dt_{22}}{dt} = (b_{22})^{(3)}T_{21} - \begin{bmatrix}
(b_{22})^{(4)} & -(b_{22})^{(3)}(G_{23}, t) & -(b_{19})^{(2,2,2)}(G_{19}, t) & -(b_{15})^{(1,1,1)}(G, t) \\
-(b_{20})^{(4,4,4,4,4)}(G_{27}, t) & -(b_{20})^{(5,5,5,5,5)}(G_{31}, t) & -(b_{34})^{(6,6,6,6,6,6)}(G_{35}, t)
\end{bmatrix} T_{22} \quad \text{*84}
\]

\[-(b_{20})^{(3)}(G_{23}, t), -(b_{21})^{(3)}(G_{23}, t), -(b_{22})^{(3)}(G_{23}, t) \text{ are first detrition coefficients for category 1, 2 and 3} \]

\[-(b_{16})^{(2,2,2)}(G_{19}, t), -(b_{17})^{(2,2,2)}(G_{19}, t), -(b_{18})^{(2,2,2)}(G_{19}, t) \text{ are second detrition coefficients for category 1, 2 and 3} \]

\[-(b_{13})^{(1,1,1)}(G, t), -(b_{14})^{(1,1,1)}(G, t), -(b_{15})^{(1,1,1)}(G, t) \text{ are third detrition coefficients for category 1, 2 and 3} \]

\[-(b_{24})^{(4,4,4,4,4,4)}(G_{27}, t), -(b_{25})^{(4,4,4,4,4,4)}(G_{27}, t), -(b_{26})^{(4,4,4,4,4,4)}(G_{27}, t) \text{ are fourth detrition coefficients for category 1, 2 and 3} \]

\[-(b_{29})^{(5,5,5,5,5,5)}(G_{31}, t), -(b_{30})^{(5,5,5,5,5,5)}(G_{31}, t), -(b_{34})^{(5,5,5,5,5,5)}(G_{31}, t) \text{ are fifth detrition coefficients for category 1, 2 and 3} \]

\[-(b_{33})^{(6,6,6,6,6,6,6,6,6)}(G_{35}, t), -(b_{33})^{(6,6,6,6,6,6)}(G_{35}, t), -(b_{34})^{(6,6,6,6,6,6)}(G_{35}, t) \text{ are sixth detrition coefficients for category 1, 2 and 3} \quad \text{*85} \]

\[
\frac{dg_{24}}{dt} = (a_{24})^{(4)}G_{25} - \begin{bmatrix}
(a_{24})^{(4)} & +(a_{24})^{(4)}(T_{25}, t) & +(a_{25})^{(5,5)}(T_{25}, t) & +(a_{32})^{(6,6)}(T_{33}, t) \\
+(a_{13})^{(1,1,1)}(T_{14}, t) & +(a_{16})^{(2,2,2,2)}(T_{17}, t) & +(a_{20})^{(3,3,3,3)}(T_{21}, t)
\end{bmatrix} G_{24} \quad \text{*87}
\]

\[
\frac{dg_{25}}{dt} = (a_{25})^{(4)}G_{24} - \begin{bmatrix}
(a_{25})^{(4)} & +(a_{25})^{(4)}(T_{25}, t) & +(a_{26})^{(5,5)}(T_{25}, t) & +(a_{33})^{(6,6)}(T_{33}, t) \\
+(a_{14})^{(1,1,1)}(T_{14}, t) & +(a_{17})^{(2,2,2,2)}(T_{17}, t) & +(a_{22})^{(3,3,3,3)}(T_{21}, t)
\end{bmatrix} G_{25} \quad \text{*88}
\]

\[
\frac{dg_{26}}{dt} = (a_{26})^{(4)}G_{25} - \begin{bmatrix}
(a_{26})^{(4)} & +(a_{26})^{(4)}(T_{25}, t) & +(a_{27})^{(5,5)}(T_{25}, t) & +(a_{34})^{(6,6)}(T_{33}, t) \\
+(a_{15})^{(1,1,1)}(T_{14}, t) & +(a_{18})^{(2,2,2,2)}(T_{17}, t) & +(a_{23})^{(3,3,3,3)}(T_{21}, t)
\end{bmatrix} G_{26} \quad \text{*89}
\]

Where \( (a_{24})^{(4)}(T_{25}, t), (a_{25})^{(4)}(T_{25}, t), (a_{26})^{(4)}(T_{25}, t) \) are first augmentation coefficients for category 1, 2 and 3

\( +(a_{28})^{(5,5)}(T_{29}, t), +(a_{29})^{(5,5)}(T_{29}, t), +(a_{30})^{(5,5)}(T_{29}, t) \) are second augmentation coefficients for category 1, 2 and 3

\( +(a_{32})^{(6,6)}(T_{33}, t), +(a_{33})^{(6,6)}(T_{33}, t), +(a_{34})^{(6,6)}(T_{33}, t) \) are third augmentation coefficients for category 1, 2 and 3

\( +(a_{13})^{(1,1,1,1)}(T_{14}, t), +(a_{14})^{(1,1,1,1)}(T_{14}, t), +(a_{15})^{(1,1,1,1)}(T_{14}, t) \) are fourth augmentation coefficients for category 1, 2, and 3

\( +(a_{16})^{(2,2,2,2)}(T_{17}, t), +(a_{17})^{(2,2,2,2)}(T_{17}, t), +(a_{18})^{(2,2,2,2)}(T_{17}, t) \) are fifth augmentation coefficients for category 1, 2, and 3

\( +(a_{20})^{(3,3,3,3)}(T_{21}, t), +(a_{21})^{(3,3,3,3)}(T_{21}, t), +(a_{22})^{(3,3,3,3)}(T_{21}, t) \) are sixth augmentation coefficients for category 1, 2, and 3 \quad \text{*90}

\[
\frac{dt_{24}}{dt} = (b_{24})^{(4)}T_{25} - \begin{bmatrix}
(b_{24})^{(4)} & -(b_{24})^{(4)}(G_{27}, t) & -(b_{29})^{(5,5)}(G_{31}, t) & -(b_{34})^{(6,6)}(G_{35}, t) \\
-(b_{13})^{(1,1,1,1)}(G, t) & -(b_{16})^{(2,2,2,2)}(G_{19}, t) & -(b_{20})^{(3,3,3,3)}(G_{23}, t)
\end{bmatrix} T_{24} \quad \text{*93}
\]

\[
\frac{dt_{25}}{dt} = (b_{25})^{(4)}T_{24} - \begin{bmatrix}
(b_{25})^{(4)} & -(b_{25})^{(4)}(G_{27}, t) & -(b_{29})^{(5,5)}(G_{31}, t) & -(b_{33})^{(6,6)}(G_{35}, t) \\
-(b_{14})^{(1,1,1,1)}(G, t) & -(b_{17})^{(2,2,2,2)}(G_{19}, t) & -(b_{21})^{(3,3,3,3)}(G_{23}, t)
\end{bmatrix} T_{25} \quad \text{*94}
\]

73
Event, Cause, and Quantum Memory Register - An Augmentation-Arrondissement Model

\[ \frac{dT_{26}}{dt} = \left( b_{26} \right)^{(4)} T_{25} - \left\{ \begin{array}{l}
(b_{26}^{(4)}(G_{31}, t)) - (b_{30}^{(5,5)}(G_{31}, t)) - (b_{32}^{(6,6,6)}(G_{35}, t)) \\\n(b_{13}^{(1,1,1,1)}(G, t)) - (b_{18}^{(2,2,2,2)}(G_{19}, t)) - (b_{22}^{(3,3,3,3)}(G_{23}, t)) \end{array} \right\} T_{26} * 95 \]

Where \(- (b_{26}^{(4)}(G_{31}, t)), (b_{26}^{(4)}(G_{27}, t)), (b_{30}^{(4)}(G_{27}, t)), (b_{32}^{(4)}(G_{27}, t))\) are first detrition coefficients for category 1, 2 and 3

\[- (b_{26}^{(5,5)}(G_{31}, t)), (b_{26}^{(5,5)}(G_{31}, t)), (b_{30}^{(5,5)}(G_{31}, t)), (b_{32}^{(5,5)}(G_{31}, t))\] are second detrition coefficients for category 1, 2 and 3

\[- (b_{26}^{(6,6,6)}(G_{35}, t)), (b_{26}^{(6,6,6)}(G_{35}, t)), (b_{30}^{(6,6,6)}(G_{35}, t)), (b_{32}^{(6,6,6)}(G_{35}, t))\] are third detrition coefficients for category 1, 2 and 3

\[- (b_{13}^{(1,1,1,1)}(G, t)), (b_{13}^{(1,1,1,1)}(G, t)), (b_{13}^{(1,1,1,1)}(G, t)), (b_{13}^{(1,1,1,1)}(G, t))\] are fourth detrition coefficients for category 1, 2 and 3

\[- (b_{18}^{(2,2,2,2)}(G_{19}, t)), (b_{18}^{(2,2,2,2)}(G_{19}, t)), (b_{18}^{(2,2,2,2)}(G_{19}, t)), (b_{18}^{(2,2,2,2)}(G_{19}, t))\] are fifth detrition coefficients for category 1, 2 and 3

\[- (b_{22}^{(3,3,3,3)}(G_{23}, t)), (b_{22}^{(3,3,3,3)}(G_{23}, t)), (b_{22}^{(3,3,3,3)}(G_{23}, t)), (b_{22}^{(3,3,3,3)}(G_{23}, t))\] are sixth detrition coefficients for category 1, 2 and 3

\[ \frac{dG_{28}}{dt} = (a_{28}^{(5)}(G_{28}) - \left\{ \begin{array}{l}
(a_{28}^{(5)}(T_{28}, t)) + (a_{24}^{(4,4)}(T_{26}, t)) + (a_{32}^{(6,6,6)}(T_{33}, t)) \\\n+(a_{13}^{(1,1,1,1)}(T_{14}, t)) + (a_{14}^{(2,2,2,2)}(T_{17}, t)) + (a_{20}^{(3,3,3,3)}(T_{21}, t)) \end{array} \right\} G_{28} * 99 \]

\[ \frac{dG_{29}}{dt} = (a_{29}^{(5)}(G_{29}) - \left\{ \begin{array}{l}
(a_{29}^{(5)}(T_{29}, t)) + (a_{25}^{(4,4)}(T_{25}, t)) + (a_{34}^{(6,6,6)}(T_{33}, t)) \\\n+(a_{14}^{(1,1,1,1)}(T_{14}, t)) + (a_{15}^{(2,2,2,2)}(T_{17}, t)) + (a_{21}^{(3,3,3,3)}(T_{21}, t)) \end{array} \right\} G_{29} * 100 \]

\[ \frac{dG_{30}}{dt} = (a_{30}^{(5)}(G_{30}) - \left\{ \begin{array}{l}
(a_{30}^{(5)}(T_{29}, t)) + (a_{34}^{(5,5)}(T_{29}, t)) + (a_{34}^{(4,4)}(T_{29}, t)) \\\n+(a_{15}^{(1,1,1,1)}(T_{14}, t)) + (a_{16}^{(2,2,2,2)}(T_{17}, t)) + (a_{22}^{(3,3,3,3)}(T_{21}, t)) \end{array} \right\} G_{30} * 101 \]

Where \( (a_{28}^{(5)}(T_{28}, t)), (a_{29}^{(5)}(T_{29}, t)), (a_{30}^{(5)}(T_{29}, t)) \) are first augmentation coefficients for category 1, 2 and 3

And \( (a_{24}^{(4,4)}(T_{26}, t)), (a_{25}^{(4,4)}(T_{25}, t)), (a_{32}^{(6,6,6)}(T_{33}, t)) \) are second augmentation coefficients for category 1, 2 and 3

\( (a_{13}^{(1,1,1,1)}(T_{14}, t)), (a_{14}^{(1,1,1,1)}(T_{14}, t)), (a_{15}^{(1,1,1,1)}(T_{14}, t)) \) are third augmentation coefficients for category 1, 2 and 3

\(+ (a_{13}^{(1,1,1,1)}(T_{14}, t)), (a_{14}^{(1,1,1,1)}(T_{14}, t)), (a_{15}^{(1,1,1,1)}(T_{14}, t)) \) are fourth augmentation coefficients for category 1, 2 and 3

\( (a_{16}^{(2,2,2,2)}(T_{17}, t)), (a_{16}^{(2,2,2,2)}(T_{17}, t)), (a_{16}^{(2,2,2,2)}(T_{17}, t)) \) are fifth augmentation coefficients for category 1, 2 and 3

\( (a_{17}^{(1,1,1,1)}(T_{14}, t)), (a_{17}^{(1,1,1,1)}(T_{14}, t)), (a_{17}^{(1,1,1,1)}(T_{14}, t)) \) are sixth augmentation coefficients for category 1, 2, 3

\[ \frac{dT_{28}}{dt} = (b_{28}^{(5)}(G_{28}) - \left\{ \begin{array}{l}
(b_{28}^{(5)}(G_{41}, t)) - (b_{24}^{(4,4)}(G_{27}, t)) - (b_{32}^{(6,6,6)}(G_{35}, t)) \\\n-(b_{13}^{(1,1,1,1)}(G, t)) - (b_{16}^{(2,2,2,2)}(G_{19}, t)) - (b_{22}^{(3,3,3,3)}(G_{23}, t)) \end{array} \right\} T_{28} * 104 \]

\[ \frac{dT_{29}}{dt} = (b_{29}^{(5)}(G_{29}) - \left\{ \begin{array}{l}
(b_{29}^{(5)}(G_{31}, t)) - (b_{25}^{(4,4)}(G_{27}, t)) - (b_{33}^{(6,6,6)}(G_{35}, t)) \\\n-(b_{14}^{(1,1,1,1)}(G, t)) - (b_{17}^{(2,2,2,2)}(G_{19}, t)) - (b_{22}^{(3,3,3,3)}(G_{23}, t)) \end{array} \right\} T_{29} * 105 \]

\[ \frac{dT_{30}}{dt} = (b_{30}^{(5)}(G_{30}) - \left\{ \begin{array}{l}
(b_{30}^{(5)}(G_{31}, t)) - (b_{26}^{(4,4)}(G_{27}, t)) - (b_{34}^{(6,6,6)}(G_{35}, t)) \\\n-(b_{15}^{(1,1,1,1)}(G, t)) - (b_{18}^{(2,2,2,2)}(G_{19}, t)) - (b_{22}^{(3,3,3,3)}(G_{23}, t)) \end{array} \right\} T_{30} * 106 \]
where 
\[-(b_{28}^{(5)})(G_{31}, t)\], \[-(b_{29}^{(5)})(G_{31}, t)\], \[-(b_{30}^{(5)})(G_{31}, t)\] are first detrition coefficients for category 1, 2 and 3

\[-(b_{24}^{(4,4)})(G_{27}, t)\], \[-(b_{25}^{(4,4)})(G_{27}, t)\], \[-(b_{26}^{(4,4)})(G_{27}, t)\]

are second detrition coefficients for category 1, 2 and 3

\[-(b_{32}^{(6,6,6)})(G_{29}, t)\], \[-(b_{33}^{(6,6,6)})(G_{29}, t)\], \[-(b_{34}^{(6,6,6)})(G_{29}, t)\] are third detrition coefficients for category 1, 2 and 3

\[-(b_{13}^{(1,1,1,1,1)})(G, t)\], \[-(b_{14}^{(1,1,1,1,1)})(G, t)\], \[-(b_{15}^{(1,1,1,1,1)})(G, t)\] are fourth detrition coefficients for category 1, 2, and 3

\[-(b_{16}^{(2,2,2,2,2)})(G_{19}, t)\], \[-(b_{17}^{(2,2,2,2,2)})(G_{19}, t)\], \[-(b_{18}^{(2,2,2,2,2)})(G_{19}, t)\]

are fifth detrition coefficients for category 1, 2, and 3

\[-(b_{20}^{(3,3,3,3,3)})(G_{23}, t)\], \[-(b_{21}^{(3,3,3,3,3)})(G_{23}, t)\], \[-(b_{22}^{(3,3,3,3,3)})(G_{23}, t)\] are sixth detrition coefficients for category 1, 2, and 3

*107

\[\frac{dg_{32}}{dt} = (a_{32})^{(6)}G_{32} - \left(\frac{(a_{32})^{(6)}}{+(a_{32})^{(6)}}(T_{32}, t) + (a_{29})^{(5,5,5)}(T_{29}, t) + (a_{24})^{(4,4,4)}(T_{24}, t)\right)\]

*109

\[\frac{dg_{33}}{dt} = (a_{33})^{(6)}G_{33} - \left(\frac{(a_{33})^{(6)}}{+(a_{33})^{(6)}}(T_{33}, t) + (a_{29})^{(5,5,5)}(T_{29}, t) + (a_{25})^{(4,4,4)}(T_{25}, t)\right)\]

*110

\[\frac{dg_{34}}{dt} = (a_{34})^{(6)}G_{34} - \left(\frac{(a_{34})^{(6)}}{+(a_{34})^{(6)}}(T_{34}, t) + (a_{29})^{(5,5,5)}(T_{29}, t) + (a_{26})^{(4,4,4)}(T_{26}, t)\right)\]

*111

\[\left(\frac{(a_{32})^{(6)}}{+(a_{32})^{(6)}}(T_{32}, t) + (a_{29})^{(5,5,5)}(T_{29}, t) + (a_{24})^{(4,4,4)}(T_{24}, t)\right)\]

are first augmentation coefficients for category 1, 2 and 3

\[\left(\frac{(a_{33})^{(6)}}{+(a_{33})^{(6)}}(T_{33}, t) + (a_{29})^{(5,5,5)}(T_{29}, t) + (a_{25})^{(4,4,4)}(T_{25}, t)\right)\]

are second augmentation coefficients for category 1, 2 and 3

\[\left(\frac{(a_{34})^{(6)}}{+(a_{34})^{(6)}}(T_{34}, t) + (a_{29})^{(5,5,5)}(T_{29}, t) + (a_{26})^{(4,4,4)}(T_{26}, t)\right)\]

are third augmentation coefficients for category 1, 2 and 3

*112

\[\left(\frac{(a_{13})^{(1,1,1,1,1)}}{+(a_{13})^{(1,1,1,1,1)}}(T_{14}, t) + (a_{14})^{(1,1,1,1,1)}(T_{14}, t) + (a_{15})^{(1,1,1,1,1)}(T_{14}, t)\right)\]

are fourth augmentation coefficients

*113

\[\left(\frac{(a_{16})^{(2,2,2,2,2)}}{+(a_{16})^{(2,2,2,2,2)}}(T_{17}, t) + (a_{17})^{(2,2,2,2,2)}(T_{17}, t) + (a_{18})^{(2,2,2,2,2)}(T_{17}, t)\right)\]

fifth augmentation coefficients

\[\left(\frac{(a_{20})^{(3,3,3,3,3)}}{+(a_{20})^{(3,3,3,3,3)}}(T_{21}, t) + (a_{21})^{(3,3,3,3,3)}(T_{21}, t) + (a_{22})^{(3,3,3,3,3)}(T_{21}, t)\right)\]

sixth augmentation coefficients

*114

\[\frac{dT_{32}}{dt} = (b_{32})^{(6)}T_{32} - \left(\frac{(b_{32})^{(6)}}{-(b_{32})^{(6)}}(G_{35}, t) - (b_{28})^{(5,5,5)}(G_{24}, t) - (b_{24})^{(4,4,4)}(G_{27}, t)\right)\]

*115

\[\frac{dT_{33}}{dt} = (b_{33})^{(6)}T_{32} - \left(\frac{(b_{33})^{(6)}}{-(b_{33})^{(6)}}(G_{35}, t) - (b_{28})^{(5,5,5)}(G_{24}, t) - (b_{24})^{(4,4,4)}(G_{27}, t)\right)\]

*116

\[\frac{dT_{34}}{dt} = (b_{34})^{(6)}T_{32} - \left(\frac{(b_{34})^{(6)}}{-(b_{34})^{(6)}}(G_{35}, t) - (b_{28})^{(5,5,5)}(G_{24}, t) - (b_{24})^{(4,4,4)}(G_{27}, t)\right)\]

are first detrition coefficients for category 1, 2 and 3

\[\left(\frac{(b_{28})^{(5,5,5)}}{-(b_{28})^{(5,5,5)}}(G_{31}, t) - (b_{29})^{(5,5,5)}(G_{31}, t) - (b_{29})^{(5,5,5)}(G_{31}, t)\right)\]

are second detrition coefficients for category 1, 2 and 3

75
are fourth detrition coefficients for category 1, 2, and 3

are fifth detrition coefficients for category 1, 2, and 3

are sixth detrition coefficients for category 1, 2, and 3

Where we suppose*119

The functions \( (a_i^{(1)})^{(1)}, (b_i^{(1)})^{(1)} \) are positive continuous increasing and bounded.

**Definition of** \((p_i)^{(1)}\), \((r_i)^{(1)}\):

\[
(a_i^{(1)})(T_{14}, t) \leq (p_i)^{(1)}(1) \leq (\tilde{A}_{13})^{(1)}
\]

\[
(b_i^{(1)})(G, t) \leq (r_i)^{(1)}(1) \leq (\tilde{B}_{13})^{(1)} \]

**Definition of** \((\tilde{A}_{13})^{(1)}, (\tilde{B}_{13})^{(1)}\):

Where \([\tilde{A}_{13}]^{(1)}, (\tilde{B}_{13})^{(1)}, (p_i)(1), (r_i)(1)\) are positive constants and \(i = 13, 14, 15\)

They satisfy Lipschitz condition:

\[
| (a_i^{(1)})(T_{14}, t) - (a_i^{(1)})(T_{14}, t) | \leq (\tilde{k}_{13})^{(1)}|T_{14} - T_{14}^{*}| e^{-h_{13}^{(1)}t}
\]

\[
|(b_i^{(1)})(G, t) - (b_i^{(1)})(G, t) | \leq (\tilde{k}_{13})^{(1)}|G - G^{*}| e^{-h_{13}^{(1)}t} \]

With the Lipschitz condition, we place a restriction on the behavior of functions \((a_i^{(1)})(T_{14}, t)\) and \((a_i^{(1)})(T_{14}, t)\). \((T_{14}, t)\) and \((T_{14}, t)\) are points belonging to the interval \([\tilde{k}_{13}]^{(1)}, (\tilde{M}_{13})^{(1)}\). It is to be noted that \((a_i^{(1)})(T_{14}, t)\) is uniformly continuous. In the eventuality of the fact, that if \((M_{13})^{(1)} = 1\) then the function \((a_i^{(1)})(T_{14}, t)\), the first augmentation coefficient WOULD be absolutely continuous.

**Definition of** \((M_{13})^{(1)}, (\tilde{M}_{13})^{(1)}\):

(D) \((M_{13})^{(1)}, (\tilde{M}_{13})^{(1)}\), are positive constants

\[
\frac{(a_i^{(1)})}{(M_{13})^{(1)}} < 1 *127
\]

**Definition of** \((\tilde{P}_{13})^{(1)}, (\tilde{Q}_{13})^{(1)}\):

(E) There exists two constants \((\tilde{P}_{13})^{(1)}\) and \((\tilde{Q}_{13})^{(1)}\) which together with \((M_{13})^{(1)}, (\tilde{M}_{13})^{(1)}, (\tilde{A}_{13})^{(1)}\)

and \((\tilde{B}_{13})^{(1)}\) and the constants \((a_i^{(1)}), (b_i^{(1)}), (b_i^{(1)}), (p_i)(1), (r_i)(1), i = 13, 14, 15\), satisfy the inequalities

\[
\frac{1}{(M_{13})^{(1)}}[ (a_i^{(1)}) + (b_i^{(1)}) + (\tilde{A}_{13})^{(1)} + (\tilde{M}_{13})^{(1)} < 1
\]

\[
\frac{1}{(M_{13})^{(1)}}[ (b_i^{(1)}) + (b_i^{(1)}) + (\tilde{B}_{13})^{(1)} + (\tilde{Q}_{13})^{(1)} + (\tilde{M}_{13})^{(1)} < 1 *128
\]

Where we suppose*134

\[(a_i^{(2)})(a_i^{(2)})^{(2)}, (b_i^{(2)})(b_i^{(2)})^{(2)}, (b_i^{(2)})^{(2)} > 0, \quad i, j = 16, 17, 18 *135
\]

The functions \((a_i^{(2)})(b_i^{(2)})\) are positive continuous increasing and bounded.*136

**Definition of** \((p_i)^{(2)}, (r_i)^{(2)}\), *137

\[(a_i^{(2)})(T_{17}, t) \leq (p_i)^{(2)}(2) \leq (\tilde{A}_{16})^{(2)} \]

\[(b_i^{(2)})(G_{19}, t) \leq (r_i)^{(2)}(2) \leq (\tilde{B}_{16})^{(2)} \]

*117
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

Definition of \((\hat{A}_{16})^{(2)}(\hat{B}_{16})^{(2)}\):

Where \((\hat{A}_{16})^{(2)}, (\hat{B}_{16})^{(2)}, (p_{1}), (r_{1})\) are positive constants and \(i = 16, 17, 18\)

They satisfy Lipschitz condition:

\[
|a_{i}^{(2)}(T_{17}, t) - a_{i}^{(2)}(T_{17}, t')| \leq t|T_{17} - T_{17}'|e^{-\left(\hat{A}_{16}\right)^{(2)}} \quad i = 1, 2, \ldots, 10
\]

With the Lipschitz condition, we place a restriction on the behavior of functions \((\hat{a}_{i})^{(2)}(T_{17}, t)\) and \((\hat{a}_{i})^{(2)}(T_{17}, t)\). And \((T_{17}, t)\) and \((T_{17}, t')\) are points belonging to the interval \([\hat{k}_{i}, \hat{k}_{i}^{(2)}]\). It is to be noted that \((\hat{a}_{i})^{(2)}(T_{17}, t)\) is uniformly continuous. In the eventuality of the fact, that if \((\hat{M}_{16})^{(2)} = 1\) then the function \((\hat{a}_{i})^{(2)}(T_{17}, t)\), the SECOND augmentation coefficient would be absolutely continuous.

**Definition of \((\hat{M}_{16})^{(2)}, (\hat{k}_{16})^{(2)}\):**

\((F)\) \((\hat{M}_{16})^{(2)}, (\hat{k}_{16})^{(2)}\), are positive constants

**Definition of \((\hat{P}_{13})^{(2)}, (\hat{Q}_{13})^{(2)}\):**

There exists two constants \((\hat{P}_{16})^{(2)}\) and \((\hat{Q}_{16})^{(2)}\) which together with \((\hat{M}_{16})^{(2)},(\hat{k}_{16})^{(2)},(\hat{A}_{16})^{(2)},(\hat{B}_{16})^{(2)}\) and \((a_{i}), (b_{i}), (p_{1}), (r_{1})\) satisfy the inequalities

\[
\frac{1}{(\hat{M}_{16})^{(2)}} \left( a_{i}^{(2)} + (\hat{A}_{16})^{(2)} + (\hat{P}_{16})^{(2)}(\hat{k}_{16})^{(2)} \right) < 1
\]

Where we suppose

\((G)\) \((a_{i}), (a_{i})^{(3)}, (b_{i}), (b_{i})^{(3)}, (p_{1}), (r_{1}), i, j, k = 20, 21, 22\)

The functions \((a_{i}), (b_{i})\) are positive continuous increasing and bounded.

**Definition of \((p_{3}), (r_{3})\):**

\((a_{i})^{(3)}(T_{21}, t) \leq (p_{3})^{(3)} \leq (\hat{A}_{20})^{(3)}\)

\((b_{i})^{(3)}(G_{23}, t) \leq (r_{3})^{(3)} \leq (\hat{B}_{20})^{(3)}\)

\(\lim_{t \to \infty} (a_{i})^{(3)}(T_{21}, t) = (p_{3})^{(2)}\)

\(\lim_{t \to \infty} (b_{i})^{(3)}(G_{23}, t) = (r_{3})^{(3)}\)

**Definition of \((\hat{A}_{20})^{(3)}, (\hat{B}_{20})^{(3)}\):**

Where \((\hat{A}_{20})^{(3)}, (\hat{B}_{20})^{(3)}, (p_{3}), (r_{3})\) are positive constants and \(i = 20, 21, 22\)

They satisfy Lipschitz condition:

\[
|a_{i}^{(3)}(T_{21}, t) - a_{i}^{(3)}(T_{21}, t')| \leq (\hat{B}_{20})^{(3)}|T_{21} - T_{21}'|e^{-\left(\hat{A}_{20}\right)^{(3)}}
\]

With the Lipschitz condition, we place a restriction on the behavior of functions \((a_{i})^{(3)}(T_{21}, t)\) and \((a_{i})^{(3)}(T_{21}, t)\). And \((T_{21}, t)\) and \((T_{21}, t')\) are points belonging to the interval \([\hat{k}_{20}, (\hat{M}_{20})^{(3)}]\). It is to be noted that \((a_{i})^{(3)}(T_{21}, t)\) is uniformly continuous. In the eventuality of the fact, that if \((\hat{M}_{20})^{(3)} = 1\) then the function \((a_{i})^{(3)}(T_{21}, t)\), the THIRD augmentation coefficient, would be absolutely continuous.

**Definition of \((\hat{M}_{20})^{(3)}, (\hat{k}_{20})^{(3)}\):**

\((H)\) \((\hat{M}_{20})^{(3)}, (\hat{k}_{20})^{(3)}, (p_{3}), (r_{3})\) are positive constants

\[
\frac{1}{(\hat{M}_{20})^{(3)}} \left( a_{i}^{(3)} + (\hat{A}_{20})^{(3)} + (\hat{P}_{20})^{(3)}(\hat{k}_{20})^{(3)} \right) < 1
\]

There exists two constants \((\hat{P}_{20})^{(3)}\) and \((\hat{Q}_{20})^{(3)}\) which together with \((\hat{M}_{20})^{(3)}, (\hat{k}_{20})^{(3)}, (a_{i}), (b_{i}), (p_{1}), (r_{1}), i, j, k = 20, 21, 22\)

The constants \((a_{i}), (a_{i})^{(3)}, (b_{i}), (b_{i})^{(3)}, (p_{1}), (r_{1})\) satisfy the inequalities

\[
\frac{1}{(\hat{M}_{20})^{(3)}} \left( a_{i}^{(3)} + (\hat{A}_{20})^{(3)} + (\hat{P}_{20})^{(3)}(\hat{k}_{20})^{(3)} \right) < 1
\]
Where we suppose*(168)

\[ (I) \quad (a_i)^{(4)}, (a_i')^{(4)}, (b_j)^{(4)}, (b_j')^{(4)}, (b_j'')^{(4)}, \quad i = 24, 25, 26 \]

The functions \((a''^{(4)}), (b''^{(4)})\) are positive continuous increasing and bounded.

**Definition of \((p_i)^{(4)}, (r_j)^{(4)}\):**

\[ (a''^{(4)})(T_{25}, t) \leq (p_i)^{(4)} \leq (\hat{A}_{24})^{(4)} \]

\[ (b''^{(4)})(G_{27}, t) \leq (r_j)^{(4)} \leq (b^{(4)}) \leq (\hat{B}_{24})^{(4)} * 169 \]

\[ (K) \quad \lim_{T_{25} \to \infty}(a''^{(4)})(T_{25}, t) = (p_i)^{(4)} \]

\[ \lim_{G_{27} \to \infty}(b''^{(4)})(G_{27}, t) = (r_j)^{(4)} \]

**Definition of \((\hat{A}_{24})^{(4)}, (\hat{B}_{24})^{(4)}\):**

Where \((\hat{A}_{24})^{(4)}, (\hat{B}_{24})^{(4)}, (p_i)^{(4)}, (r_j)^{(4)}\) are positive constants and \(i = 24, 25, 26\)

They satisfy Lipschitz condition:

\[ |(a''^{(4)})(T_{25}, t) - (a''^{(4)})(T_{25}, t)| \leq (\hat{A}_{24})^{(4)} |T_{25} - T_{25}'| e^{-(\hat{A}_{24})^{(4)}} t \]

\[ |(b''^{(4)})(G_{27}, t) - (b''^{(4)})(G_{27}, t)| \leq (\hat{B}_{24})^{(4)} |(G_{27}) - (G_{27})'| e^{-(\hat{B}_{24})^{(4)}} t * 171 \]

With the Lipschitz condition, we place a restriction on the behavior of functions \((a''^{(4)})(T_{25}, t)\) and \((b''^{(4)})(G_{27}, t)\) and \((T_{25}, t)\). And \((T_{25}, t)\) are points belonging to the interval \([\hat{A}_{24}^{(4)}, (\hat{B}_{24})^{(4)}]\). It is to be noted that \((a''^{(4)})(T_{25}, t)\) is uniformly continuous. In the eventuality of the fact, that if \((\hat{M}_{24})^{(4)} = 4\) then the function \((a''^{(4)})(T_{25}, t)\), the FOURTH augmentation coefficient WOULD be absolutely continuous. *172

**Definition of \((\tilde{M}_{24})^{(4)}, (\tilde{K}_{24})^{(4)}\):**

\[ (L) \quad (\tilde{M}_{24})^{(4)}, (\tilde{K}_{24})^{(4)}, \text{ are positive constants} \]

\[ (M) \quad \frac{(a_i)^{(4)}}{(\tilde{M}_{24})^{(4)}} < 1 \]

**Definition of \((\tilde{P}_{24})^{(4)}, (\tilde{Q}_{24})^{(4)}\):**

\[ (N) \quad \text{There exists two constants} \quad (\tilde{P}_{24})^{(4)} \text{ and } (\tilde{Q}_{24})^{(4)} \text{ which together with } \quad (\tilde{M}_{24})^{(4)}, (\tilde{K}_{24})^{(4)}, (\tilde{A}_{24})^{(4)}, (\tilde{B}_{24})^{(4)} \text{ and } \quad (a_i)^{(4)}, (a_j)^{(4)}, (b_j)^{(4)}, (b_j')^{(4)}, (p_i)^{(4)}, (r_j)^{(4)}, i = 24, 25, 26, \]

satisfy the inequalities:

\[ \frac{1}{\tilde{M}_{24}^{(4)}} [(a_i)^{(4)} + (a_j)^{(4)} + (\tilde{A}_{24})^{(4)} + (\tilde{B}_{24})^{(4)} (\tilde{K}_{24})^{(4)}] < 1 \]

\[ \frac{1}{\tilde{M}_{24}^{(4)}} [(b_i)^{(4)} + (b_j')^{(4)} + (\tilde{B}_{24})^{(4)} + (\tilde{Q}_{24})^{(4)} (\tilde{K}_{24})^{(4)}] < 1 \quad * 175 \]

Where we suppose*176

\[ (O) \quad (a_j)^{(5)}, (a_j')^{(5)}, (a_j''^{(5)}), (b_j)^{(5)}, (b_j')^{(5)}, (b_j'')^{(5)}, (b_j''')^{(5)} > 0, \quad i, j = 28, 29, 30 \]

**P** The functions \((a''^{(5)}), (b''^{(5)})\) are positive continuous increasing and bounded.

**Definition of \((p_i)^{(5)}, (r_j)^{(5)}\):**

\[ (a''^{(5)})(T_{29}, t) \leq (p_i)^{(5)} \leq (\tilde{A}_{28})^{(5)} \]

\[ (b''^{(5)})(G_{31}, t) \leq (r_j)^{(5)} \leq (b^{(5)}) \leq (\tilde{B}_{28})^{(5)} * 177 \]

\[ (Q) \quad \lim_{T_{29} \to \infty}(a''^{(5)})(T_{29}, t) = (p_i)^{(5)} \]

\[ \lim_{G_{31} \to \infty}(b''^{(5)})(G_{31}, t) = (r_j)^{(5)} \]

**Definition of \((\tilde{A}_{28})^{(5)}, (\tilde{B}_{28})^{(5)}\):**

Where \((\tilde{A}_{28})^{(5)}, (\tilde{B}_{28})^{(5)}, (p_i)^{(5)}, (r_j)^{(5)}\) are positive constants and \(i = 28, 29, 30\)

They satisfy Lipschitz condition:

\[ |(a''^{(5)})(T_{29}, t) - (a''^{(5)})(T_{29}, t)| \leq (\tilde{A}_{28})^{(5)} |T_{29} - T_{29}'| e^{-(\tilde{A}_{28})^{(5)}} t \]

\[ |(b''^{(5)})(G_{31}, t) - (b''^{(5)})(G_{31}, t)| \leq (\tilde{B}_{28})^{(5)} |(G_{31}) - (G_{31})'| e^{-(\tilde{B}_{28})^{(5)}} t * 179 \]
With the Lipschitz condition, we place a restriction on the behavior of functions \( (a'^{(5)}(T_{28}, t)) \) and \( (a''^{(5)}(T_{29}, t)) \). \( (T_{28}, t) \) and \( (T_{29}, t) \) are points belonging to the interval \([k_{28}^{(5)}), (M_{28}^{(5)})]\). It is to be noted that \( (a'^{(5)}(T_{28}, t)) \) is uniformly continuous. In the eventuality of the fact, that if \( (M_{28}^{(5)}) = 5 \) then the function \( (a'^{(5)}(T_{28}, t)) \), the FIFTH augmentation coefficient attributable would be absolutely continuous.

**Definition of \( \hat{M}_{28}^{(5)}(\hat{k}_{28}^{(5)}) \):**

\[
\frac{1}{(M_{28}^{(5)})^{5}} \left[ (a_{1}^{(5)} + (a_{2}^{(5)}) + (\hat{A}_{28}^{(5)}) + (\hat{P}_{28}^{(5)}) (\hat{k}_{28}^{(5)})^{5} < 1
\]

**Definition of \( \hat{P}_{28}^{(5)}(\hat{Q}_{28}^{(5)}) \):**

\[
\begin{align*}
1 \frac{1}{(M_{28}^{(5)})^{5}} \left[ (b_{1}^{(5)} + (b_{2}^{(5)}) + (\hat{B}_{28}^{(5)}) + (\hat{Q}_{28}^{(5)}) (\hat{k}_{28}^{(5)})^{5} < 1 \end{align*}
\]

Where we suppose \( a_{i}^{(6)}, a_{i}^{(6)}, a_{i}^{(6)}, a_{i}^{(6)}, a_{i}^{(6)}, a_{i}^{(6)}, a_{i}^{(6)}, a_{i}^{(6)} > 0, \quad i, j = 32,33,34 \)

**Theorem 1:** if the conditions IN THE FOREGOING above are fulfilled, there exists a solution satisfying the conditions.

**Definition of \( G_{i}(0), T_{i}(0) \):**

\[
G_{i}(t) \leq (\hat{P}_{13}^{(1)})^{1} e^{(\hat{R}_{13}^{(1)})^{2} t}, \quad G_{i}(0) = G_{i}^{0} > 0
\]

\[
T_{i}(t) \leq (\hat{Q}_{13}^{(1)})^{1} e^{(\hat{R}_{13}^{(1)})^{2} t}, \quad T_{i}(0) = T_{i}^{0} > 0
\]
Definition of $G_{i}(0), T_{i}(0)$:

$G_{i}(0) \leq (\hat{P}_{i_{16}})^{2}\epsilon^{(\beta_{i_{16}})^{2}_{i_{16}}}_{t}$, $G_{i}(0) = G_{i}^{0} > 0$

$T_{i}(0) \leq (\hat{Q}_{i_{16}})^{2}\epsilon^{(\beta_{i_{16}})^{2}_{i_{16}}}_{t}$, $T_{i}(0) = T_{i}^{0} > 0^{*193}$

Definition of $G_{i}(0), T_{i}(0)$:

$G_{i}(0) \leq (\hat{P}_{i_{24}})^{4}\epsilon^{(\beta_{i_{24}})^{4}_{i_{24}}}_{t}$, $G_{i}(0) = G_{i}^{0} > 0$

$T_{i}(0) \leq (\hat{Q}_{i_{24}})^{4}\epsilon^{(\beta_{i_{24}})^{4}_{i_{24}}}_{t}$, $T_{i}(0) = T_{i}^{0} > 0^{*196}$

Definition of $G_{i}(0), T_{i}(0)$:

$G_{i}(0) \leq (\hat{P}_{i_{28}})^{5}\epsilon^{(\beta_{i_{28}})^{5}_{i_{28}}}_{t}$, $G_{i}(0) = G_{i}^{0} > 0$

$T_{i}(0) \leq (\hat{Q}_{i_{28}})^{5}\epsilon^{(\beta_{i_{28}})^{5}_{i_{28}}}_{t}$, $T_{i}(0) = T_{i}^{0} > 0^{*197}$

198

Definition of $G_{i}(0), T_{i}(0)$:

$G_{i}(0) \leq (\hat{P}_{i_{32}})^{6}\epsilon^{(\beta_{i_{32}})^{6}_{i_{32}}}_{t}$, $G_{i}(0) = G_{i}^{0} > 0$

$T_{i}(0) \leq (\hat{Q}_{i_{32}})^{6}\epsilon^{(\beta_{i_{32}})^{6}_{i_{32}}}_{t}$, $T_{i}(0) = T_{i}^{0} > 0^{*199}$

Proof: Consider operator $\mathcal{A}^{(1)}$ defined on the space of sextuples of continuous functions $G_{i}, T_{i}: \mathbb{R}_{+} \rightarrow \mathbb{R}_{+}$ which satisfy

$G_{i}(0) = G_{i}^{0}, T_{i}(0) = T_{i}^{0}, G_{i}^{0} \leq (\hat{P}_{i_{13}})^{(3)}t, T_{i}^{0} \leq (\hat{Q}_{i_{13}})^{(3)}t, *201$

$0 \leq G_{i}(t) - G_{i}^{0} \leq (\hat{P}_{i_{13}})^{(1)}t, $ $T_{i}(t) - T_{i}^{0} \leq (\hat{Q}_{i_{13}})^{(1)}t, $ $*202$

$0 \leq T_{i}(t) - T_{i}^{0} \leq (\hat{Q}_{i_{13}})^{(1)}t, $ $*203$

By

$\tilde{G}_{13}(t) = G_{13}^{0} + \int_{0}^{t} \left[ (a_{13}^{(1)}T_{14}(s_{13}) - (a_{14}^{(1)}s_{13}) \right) G_{13}(s_{13}) ds_{13}^{*204}$

$\tilde{T}_{13}(t) = T_{13}^{0} + \int_{0}^{t} \left[ (b_{13}^{(1)}T_{14}(s_{13}) - (b_{14}^{(1)}s_{13}) \right) T_{13}(s_{13}) ds_{13}^{*207}$

Where $s_{13}$ is the integrand that is integrated over an interval $(0,t)^{*209}$

$\tilde{T}_{13}(t) = T_{13}^{0} + \int_{0}^{t} \left[ (b_{13}^{(1)}T_{14}(s_{13}) - (b_{14}^{(1)}s_{13}) \right) \tilde{T}_{13}(s_{13}) ds_{13}^{*208}$

Proof:

Consider operator $\mathcal{A}^{(2)}$ defined on the space of sextuples of continuous functions $G_{i}, T_{i}: \mathbb{R}_{+} \rightarrow \mathbb{R}_{+}$ which satisfy

$G_{i}(0) = G_{i}^{0}, T_{i}(0) = T_{i}^{0}, G_{i}^{0} \leq (\hat{P}_{i_{16}})^{(2)}t, T_{i}^{0} \leq (\hat{Q}_{i_{16}})^{(2)}t, *212$

$0 \leq G_{i}(t) - G_{i}^{0} \leq (\hat{P}_{i_{16}})^{(2)}t, $ $T_{i}(t) - T_{i}^{0} \leq (\hat{Q}_{i_{16}})^{(2)}t, $ $*213$

$0 \leq T_{i}(t) - T_{i}^{0} \leq (\hat{Q}_{i_{16}})^{(2)}t, $ $*214$

By

$\tilde{G}_{16}(t) = G_{16}^{0} + \int_{0}^{t} \left[ (a_{16}^{(2)}G_{17}(s_{16}) - (a_{17}^{(2)}s_{16}) \right) G_{16}(s_{16}) ds_{16}^{*215}$

$\tilde{T}_{16}(t) = T_{16}^{0} + \int_{0}^{t} \left[ (b_{16}^{(2)}T_{17}(s_{16}) - (b_{17}^{(2)}s_{16}) \right) T_{16}(s_{16}) ds_{16}^{*218}$

Where $s_{16}$ is the integrand that is integrated over an interval $(0,t)^{*220}$

Proof:
Consider operator $\mathcal{A}^{(3)}$ defined on the space of sextuples of continuous functions $G_i, T_i : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ which satisfy

\[G_i(0) = G_i^0, \ T_i(0) = T_i^0, \ G_i^1 \leq (\hat{P}_{20})^{(3)}, \ T_i^1 \leq (\hat{Q}_{20})^{(3)}, \ *222\]

\[0 \leq G_i(t) - G_i^1 \leq (\hat{P}_{24})^{(4)}, \ T_i^1 \leq (\hat{Q}_{24})^{(4)}, \ *232\]

\[0 \leq T_i(t) - T_i^0 \leq (\hat{Q}_{28})^{(5)}, \ *243\]

By

\[\bar{G}_{20}(t) = G_{20}^0 + \int_0^t \left( (a_{20})^{(3)}G_{21}(s_{20}) - \left( (a_{20})^{(3)} + a_{20}''^1 \right)(T_{21}(s_{20}), s_{20}) \right) ds_{20} \]

\[\bar{G}_{21}(t) = G_{21}^0 + \int_0^t \left( (a_{21})^{(3)}G_{20}(s_{20}) - \left( (a_{21})^{(3)} + a_{21}''^1 \right)(T_{20}(s_{20}), s_{20}) \right) ds_{20}\]

\[\bar{G}_{22}(t) = G_{22}^0 + \int_0^t \left( (a_{22})^{(3)}G_{21}(s_{20}) - \left( (a_{22})^{(3)} + a_{22}''^1 \right)(T_{21}(s_{20}), s_{20}) \right) ds_{20} \]

\[\bar{T}_{20}(t) = T_{20}^0 + \int_0^t \left( (b_{20})^{(3)}T_{21}(s_{20}) - \left( (b_{20})^{(3)} - b_{20}''^3 \right)(G(s_{20}), s_{20}) \right) ds_{20}\]

\[\bar{T}_{21}(t) = T_{21}^0 + \int_0^t \left( (b_{21})^{(3)}T_{20}(s_{20}) - \left( (b_{21})^{(3)} - b_{21}''^3 \right)(G(s_{20}), s_{20}) \right) ds_{20}\]

\[\bar{T}_{22}(t) = T_{22}^0 + \int_0^t \left( (b_{22})^{(3)}T_{21}(s_{20}) - \left( (b_{22})^{(3)} - b_{22}''^3 \right)(G(s_{20}), s_{20}) \right) ds_{20}\]

Where $s_{20}(t)$ is the integrand that is integrated over an interval $(0, t)$.*230

Consider operator $\mathcal{A}^{(4)}$ defined on the space of sextuples of continuous functions $G_i, T_i : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ which satisfy

\[G_i(0) = G_i^0, \ T_i(0) = T_i^0, \ G_i^1 \leq (\hat{P}_{24})^{(4)}, \ T_i^1 \leq (\hat{Q}_{24})^{(4)}, \ *232\]

\[0 \leq G_i(t) - G_i^1 \leq (\hat{P}_{24})^{(4)}e^{(\hat{Q}_{24})^{(4)}t}, \ *233\]

\[0 \leq T_i(t) - T_i^0 \leq (\hat{Q}_{24})^{(4)}e^{(\hat{Q}_{24})^{(4)}t}, \ *234\]

By

\[\bar{G}_{24}(t) = G_{24}^0 + \int_0^t \left( (a_{24})^{(4)}G_{25}(s_{24}) - \left( (a_{24})^{(4)} + a_{24}''^4 \right)(T_{25}(s_{24}), s_{24}) \right) ds_{24} \]

\[\bar{G}_{25}(t) = G_{25}^0 + \int_0^t \left( (a_{25})^{(4)}G_{24}(s_{24}) - \left( (a_{25})^{(4)} + a_{25}''^4 \right)(T_{24}(s_{24}), s_{24}) \right) ds_{24}\]

\[\bar{G}_{26}(t) = G_{26}^0 + \int_0^t \left( (a_{26})^{(4)}G_{25}(s_{24}) - \left( (a_{26})^{(4)} + a_{26}''^4 \right)(T_{25}(s_{24}, s_{24}) \right) ds_{24} \]

\[\bar{T}_{24}(t) = T_{24}^0 + \int_0^t \left( (b_{24})^{(4)}T_{25}(s_{24}) - \left( (b_{24})^{(4)} - b_{24}''^4 \right)(G(s_{24}), s_{24}) \right) ds_{24}\]

\[\bar{T}_{25}(t) = T_{25}^0 + \int_0^t \left( (b_{25})^{(4)}T_{24}(s_{24}) - \left( (b_{25})^{(4)} - b_{25}''^4 \right)(G(s_{24}), s_{24}) \right) ds_{24}\]

\[\bar{T}_{26}(t) = T_{26}^0 + \int_0^t \left( (b_{26})^{(4)}T_{25}(s_{24}) - \left( (b_{26})^{(4)} - b_{26}''^4 \right)(G(s_{24}), s_{24}) \right) ds_{24}\]

Where $s_{24}(t)$ is the integrand that is integrated over an interval $(0, t)$.*240

Consider operator $\mathcal{A}^{(5)}$ defined on the space of sextuples of continuous functions $G_i, T_i : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ which satisfy

\[G_i(0) = G_i^0, \ T_i(0) = T_i^0, \ G_i^1 \leq (\hat{P}_{28})^{(5)}, \ T_i^1 \leq (\hat{Q}_{28})^{(5)}, \ *243\]

\[0 \leq G_i(t) - G_i^1 \leq (\hat{P}_{28})^{(5)}e^{(\hat{Q}_{28})^{(5)}t}, \ *244\]

\[0 \leq T_i(t) - T_i^0 \leq (\hat{Q}_{28})^{(5)}e^{(\hat{Q}_{28})^{(5)}t}, \ *245\]

By

\[\bar{G}_{28}(t) = G_{28}^0 + \int_0^t \left( (a_{28})^{(5)}G_{29}(s_{28}) - \left( (a_{28})^{(5)} + a_{28}''^5 \right)(T_{29}(s_{28}), s_{28}) \right) ds_{28} \]

\[\bar{G}_{29}(t) = G_{29}^0 + \int_0^t \left( (a_{29})^{(5)}G_{28}(s_{28}) - \left( (a_{29})^{(5)} + a_{29}''^5 \right)(T_{28}(s_{28}), s_{28}) \right) ds_{28}\]

\[\bar{G}_{30}(t) = G_{30}^0 + \int_0^t \left( (a_{30})^{(5)}G_{29}(s_{28}) - \left( (a_{30})^{(5)} + a_{30}''^5 \right)(T_{29}(s_{28}), s_{28}) \right) ds_{28}\]

\[\bar{T}_{28}(t) = T_{28}^0 + \int_0^t \left( (b_{28})^{(5)}T_{29}(s_{28}) - \left( (b_{28})^{(5)} - b_{28}''^5 \right)(G(s_{28}), s_{28}) \right) ds_{28}\]

\[\bar{T}_{29}(t) = T_{29}^0 + \int_0^t \left( (b_{29})^{(5)}T_{28}(s_{28}) - \left( (b_{29})^{(5)} - b_{29}''^5 \right)(G(s_{28}), s_{28}) \right) ds_{28}\]

\[\bar{T}_{30}(t) = T_{30}^0 + \int_0^t \left( (b_{30})^{(5)}T_{29}(s_{28}) - \left( (b_{30})^{(5)} - b_{30}''^5 \right)(G(s_{28}), s_{28}) \right) ds_{28}\]

Where $s_{28}(t)$ is the integrand that is integrated over an interval $(0, t)$.*251

Consider operator $\mathcal{A}^{(6)}$ defined on the space of sextuples of continuous functions $G_i, T_i : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ which satisfy

\[G_i(0) = G_i^0, \ T_i(0) = T_i^0, \ G_i^1 \leq (\hat{P}_{32})^{(6)}, \ T_i^1 \leq (\hat{Q}_{32})^{(6)}, \ *253\]

\[0 \leq G_i(t) - G_i^1 \leq (\hat{P}_{32})^{(6)}e^{(\hat{Q}_{32})^{(6)}t}, \ *254\]

\[0 \leq T_i(t) - T_i^0 \leq (\hat{Q}_{32})^{(6)}e^{(\hat{Q}_{32})^{(6)}t}, \ *255\]

By
\[ G_{32}(t) = G_{32}^0 + \int_0^t \left[ (a_{32})^{(6)} s_{32}^3 (s_{32}) - (a'_{32})^{(6)} T_{33} (s_{32}) s_{32}^3 \right] ds_{32} \]  
*256

\[ G_{33}(t) = G_{33}^0 + \int_0^t \left[ (a_{33})^{(6)} s_{33}^3 (s_{32}) - (a'_{33})^{(6)} T_{33} (s_{32}) s_{32}^3 \right] ds_{32} \]  
*257

\[ G_{34}(t) = G_{34}^0 + \int_0^t \left[ (a'_{34})^{(6)} s_{34}^3 (s_{32}) - (a'_{34})^{(6)} T_{33} (s_{32}) s_{32}^3 \right] ds_{32} \]  
*258

\[ T_{32}(t) = T_{32}^0 + \int_0^t \left[ (b_{32})^{(6)} T_{32} (s_{32}) s_{32}^3 \right] ds_{32} \]  
*259

\[ T_{33}(t) = T_{33}^0 + \int_0^t \left[ (b'_{33})^{(6)} T_{33} (s_{32}) s_{32}^3 \right] ds_{32} \]  
*260

\[ T_{34}(t) = T_{34}^0 + \int_0^t \left[ (b'_{34})^{(6)} T_{34} (s_{32}) \right] ds_{32} \]  
*261

Where \( s_{32} \) is the integrand that is integrated over an interval \((0, t)\)*261

(a) The operator \( \mathcal{A}^{(1)} \) maps the space of functions satisfying GLOBAL EQUATIONS into itself. Indeed it is obvious that

\[ G_{13}(t) \leq G_{13}^0 + \int_0^t \left[ (a_{13})^{(1)} \left( G_{14}^0 + (\dot{p}_{13})^{(1)} e^{(\dot{p}_{13})^{(1)}} \right) \right] ds_{13} = \left( 1 + (a_{13})^{(1)} t \right) G_{14}^0 + \frac{(a_{13})^{(1)} \dot{p}_{13}^{(1)}}{G_{14}^0} \left( e^{(\dot{p}_{13})^{(1)}} t - 1 \right) \]  
*263

From which it follows that

\[ (G_{13}^0)^{\infty} \]  
*264

Analogous inequalities hold also for \( G_{44}^0, G_{45}^0, G_{46}^0, G_{47}^0, G_{48}^0 \). The operator \( \mathcal{A}^{(2)} \) maps the space of functions satisfying GLOBAL EQUATIONS into itself. Indeed it is obvious that

\[ G_{16}(t) \leq G_{16}^0 + \int_0^t \left[ (a_{16})^{(2)} \left( G_{17}^0 + (\dot{p}_{16})^{(2)} e^{(\dot{p}_{16})^{(2)}} \right) \right] ds_{16} = \left( 1 + (a_{16})^{(2)} t \right) G_{17}^0 + \frac{(a_{16})^{(2)} \dot{p}_{16}^{(2)}}{G_{17}^0} \left( e^{(\dot{p}_{16})^{(2)}} t - 1 \right) \]  
*267

From which it follows that

\[ (G_{16}^0)^{\infty} \]  
*268

Analogous inequalities hold also for \( G_{17}, G_{18}, G_{19}, G_{20}, G_{21}, G_{22}, G_{23}, G_{24} \). The operator \( \mathcal{A}^{(3)} \) maps the space of functions satisfying GLOBAL EQUATIONS into itself. Indeed it is obvious that

\[ G_{20}(t) \leq G_{20}^0 + \int_0^t \left[ (a_{20})^{(3)} \left( G_{21}^0 + (\dot{p}_{20})^{(3)} e^{(\dot{p}_{20})^{(3)}} \right) \right] ds_{20} = \left( 1 + (a_{20})^{(3)} t \right) G_{21}^0 + \frac{(a_{20})^{(3)} \dot{p}_{20}^{(3)}}{G_{21}^0} \left( e^{(\dot{p}_{20})^{(3)}} t - 1 \right) \]  
*270

From which it follows that

\[ (G_{20}^0)^{\infty} \]  
*271

Analogous inequalities hold also for \( G_{21}, G_{22}, G_{23}, G_{24}, G_{25} \). The operator \( \mathcal{A}^{(4)} \) maps the space of functions satisfying GLOBAL EQUATIONS into itself. Indeed it is obvious that

\[ G_{24}(t) \leq G_{24}^0 + \int_0^t \left[ (a_{24})^{(4)} \left( G_{25}^0 + (\dot{p}_{24})^{(4)} e^{(\dot{p}_{24})^{(4)}} \right) \right] ds_{24} = \left( 1 + (a_{24})^{(4)} t \right) G_{25}^0 + \frac{(a_{24})^{(4)} \dot{p}_{24}^{(4)}}{G_{25}^0} \left( e^{(\dot{p}_{24})^{(4)}} t - 1 \right) \]  
*273

From which it follows that

\[ (G_{24}^0)^{\infty} \]  
*274

Analogous inequalities hold also for \( G_{25}, G_{26}, G_{27}, G_{28}, G_{29}, G_{30}, G_{31} \). The operator \( \mathcal{A}^{(5)} \) maps the space of functions satisfying GLOBAL EQUATIONS into itself. Indeed it is obvious that

\[ G_{28}(t) \leq G_{28}^0 + \int_0^t \left[ (a_{28})^{(5)} \left( G_{29}^0 + (\dot{p}_{28})^{(5)} e^{(\dot{p}_{28})^{(5)}} \right) \right] ds_{28} = \left( 1 + (a_{28})^{(5)} t \right) G_{29}^0 + \frac{(a_{28})^{(5)} \dot{p}_{28}^{(5)}}{G_{29}^0} \left( e^{(\dot{p}_{28})^{(5)}} t - 1 \right) \]  
*275

82
From which it follows that

\[
(G_{28}(t) - G_{29}^0)e^{-\left(\frac{a_{28}}{c_{28}}\right) t} \leq \left(\frac{a_{28}}{c_{28}}\right) \left(\left(\hat{P}_{28}(5) + G_{29}^0\right)e^{-\frac{\left(\hat{P}_{28}(5) + G_{29}^0\right)}{c_{28}}} + (\hat{P}_{28}(5))\right)
\]

\((G)^0\) is as defined in the statement of theorem 1

\(a_{28}\) is as defined in the statement of theorem 1*

(d) The operator \(\mathcal{A}(6)\) maps the space of functions satisfying GLOBAL EQUATIONS into itself. Indeed it is obvious that

\[
G_{32}(t) \leq G_{32} + \int_0^t \left[ (a_{32}(6) G_{32}^0 + (\hat{P}_{32}(6)) e^{(\hat{M}_{32}(6)) x(32)} \right] \ dS_{32} = \\
(1 + (a_{32}(6) t)) G_{32}^0 + \int_0^t \left[ (a_{32}(6) G_{32}^0 \right] e^{(\hat{M}_{32}(6)) t - 1} \* 277
\]

From which it follows that

\[
(G_{32}(t) - G_{32}^0)e^{-\left(\frac{a_{32}}{c_{32}}\right) t} \leq \left(\frac{a_{32}}{c_{32}}\right) \left(\left(\hat{P}_{32}(6) + G_{33}^0\right)e^{-\frac{\left(\hat{P}_{32}(6) + G_{33}^0\right)}{c_{32}}} + (\hat{P}_{32}(6))\right)
\]

\((G)^0\) as is defined in the statement of theorem 6*

Analogous inequalities hold also for \(G_{25}, G_{26}, T_{24}, T_{25}, T_{26}\) *278

*279

It is now sufficient to take \(\frac{a_{13}(1)}{\hat{M}_{13}(1)}, \frac{b_{13}(1)}{\hat{M}_{13}(1)} < 1\) and to choose

\((\hat{P}_{13})^{(1)}\) and \((\hat{Q}_{13})^{(1)}\) large to have*281

\[
\int_0^t \left[ (a_{13}(6) + G_{13}^0) e^{-\left(\frac{a_{13}(6) + G_{13}^0}{c_{13}}\right)} \right] \leq (\hat{P}_{13})^{(1)} \* 283
\]

\[
\int_0^t \left[ (\hat{Q}_{13})^{(1)} + T_{13}^0 e^{-\left(\frac{\hat{Q}_{13}^{(1)} + T_{13}^0}{c_{13}}\right)} \right] \leq (\hat{Q}_{13})^{(1)} \* 284
\]

In order that the operator \(\mathcal{A}(1)\) transforms the space of sextuples of functions \(G_i, T_i\) satisfying GLOBAL EQUATIONS into itself*285

The operator \(\mathcal{A}(1)\) is a contraction with respect to the metric

\[
d \left( \left( G^{(1)}, T^{(1)} \right), \left( G^{(2)}, T^{(2)} \right) \right) = \\
\sup_{t \in [0, T]} \max_{i \in \mathbb{N}_+} \left| G_i^{(1)}(t) - G_i^{(2)}(t) \right| e^{-\left(\frac{G_i^{(1)}(t) + G_i^{(2)}(t)}{c_i} \right)} + \max_{t \in [0, T]} \left| T_i^{(1)}(t) - T_i^{(2)}(t) \right| e^{-\left(\frac{T_i^{(1)}(t) + T_i^{(2)}(t)}{c_i} \right)} \* 286
\]

Indeed if we denote

**Definition of \(\mathcal{G}, \mathcal{T}\):**

\[
(\mathcal{G}, \mathcal{T}) = \mathcal{A}(1)(G, T)
\]

It results

\[
\left| G_{13}(1) - G_{13}^{(2)} \right| \leq \int_0^t \left| (a_{13}(1) \left| G_{13}(1) - G_{13}^{(2)} \right| e^{-\left(\frac{G_{13}^{(1)}(t) + G_{13}^{(2)}(t)}{c_{13}} \right)} \right| dS_{13} + \\
\int_0^t \left| (a_{13}(1) \left| G_{13}^{(1)}(t) - G_{13}^{(2)}(t) \right| e^{-\left(\frac{G_{13}^{(1)}(t) + G_{13}^{(2)}(t)}{c_{13}} \right)} \right| dS_{13} + \\
\int_0^t \left| (a_{13}''(1) \left| T_{13}^{(1)}(t) - T_{13}^{(2)}(t) \right| e^{-\left(\frac{T_{13}^{(1)}(t) + T_{13}^{(2)}(t)}{c_{13}} \right)} \right| dS_{13} + \\
\int_0^t \left| (a_{13}''(1) \left| T_{13}^{(1)}(t) + S_{13}(t) \right| e^{-\left(\frac{T_{13}^{(1)}(t) + S_{13}(t)}{c_{13}} \right)} \right| dS_{13}
\]

Where \(S_{13}\) represents integrand that is integrated over the interval [0, t]

From the hypotheses it follows*287

\[
\left| G_{13}^{(1)} - G_{13}^{(2)} \right| e^{-\left(\frac{a_{13}\hat{M}_{13}}{13^{(1)}(1)} \right)} \leq \\
\frac{1}{d_{13}(1)} \left( a_{13}(1) + a_{13}''(1) + (\hat{A}_{13}(1) + (\hat{P}_{13}(3) \hat{K}_{13}(3)) d \left( \left( G^{(1)}, T^{(1)} \right), \left( G^{(2)}, T^{(2)} \right) \right) \right)
\]

And analogous inequalities for \(G_{13}^{(1)}\) and \(T_{13}^{(1)}\). Taking into account the hypothesis the result follows*288

**Remark 1:** The fact that we supposed \((a_{13}(1)^{(1)}\) and \((b_{13}(1)^{(1)}\) depending also on \(t\) can be considered as not conformal with the reality, however we have put this hypothesis, in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by \((\hat{P}_{13})^{(1)}(\hat{Q}_{13})^{(1)}t\) and \((\hat{Q}_{13})^{(1)}(\hat{Q}_{13})^{(1)}t\) respectively of \(\mathbb{R}_+\).
If instead of proving the existence of the solution on $\mathbb{R}^d$, we have to prove it only on a compact then it suffices to consider that $(a_{ii}^{(1)})$, $(b_{ii}^{(1)})$, $i = 13, 14, 15$ depend only on $T_{14}$ and respectively on $G$ and not on $t$ and hypothesis can replaced by a usual Lipschitz condition.*289

**Remark 2:** There does not exist any $t$ where $G_1(t) = 0$ and $T_{14}(t) = 0$

From 19 to 24 it results

$$G_1(t) \geq G_1^0 e^{-\int_0^t (a_{ii}^{(1)}(s)-a_{ii}^{(2)}(s)) du(s_i(s_13,s_1)) ds_i(s_13)} \geq 0$$

$$T_{14}(t) \geq T_{14}^0 e^{-(b_{ii}^{(1)}(s_i(s_13,s_13))) > 0 \text{ for } t > 0}$$

**Definition of** $(\mathfrak{M}_{13}^{(1)})_{1}$ and $(\mathfrak{M}_{13}^{(1)})_{2}$:

**Remark 3:** If $G_{13}$ is bounded, the same property have also $G_{14}$ and $G_{15}$. Indeed if $\frac{dG_{14}}{dt} \leq (\mathfrak{M}_{13}^{(1)})_{1} - (a_{14}^{(1)}) G_{14}$ and by integrating

$$G_{14} \leq (\mathfrak{M}_{13}^{(1)})_{2} \leq G_{14}^{0} + 2(a_{14}^{(1)})(\mathfrak{M}_{13}^{(1)})_{1} / (a_{14}^{(1)})$$

In the same way, one can obtain

$$G_{15} \leq (\mathfrak{M}_{13}^{(1)})_{3} \leq G_{15}^{0} + 2(a_{15}^{(1)})(\mathfrak{M}_{13}^{(1)})_{1} / (a_{15}^{(1)})$$

If $G_{14}$ or $G_{15}$ is bounded, the same property follows for $G_{13}$, $G_{14}$ and $G_{15}$.

**Remark 4:** If $G_{13}$ is bounded, from below, the same property holds for $G_{14}$ and $G_{15}$. The proof is analogous with the preceding one. An analogous property is true if $G_{14}$ is bounded from below.*292

**Remark 5:** If $T_{13}$ is bounded from below and $\lim_{t \to \infty} ((b_{ii}^{(1)}) (G(t), t)) = (b_{ii}^{(1)})$ then $T_{14} \to \infty$.

**Definition of** $(m)^{(1)}$ and $\epsilon_1$:

Indeed let $t_1$ be so that for $t > t_1$

$$(b_{ii}^{(1)}) - (b_{ii}^{(1)})(G(t), t) < \epsilon_1, T_{14}(t) > (m)^{(1)}$$

Then $\frac{dG_{14}}{dt} \geq (a_{14}^{(1)}) (m)^{(1)} - \epsilon_1 T_{14}$ which leads to

$$T_{14} \geq \frac{1}{(a_{14}^{(1)}) (m)^{(1)}} (1 - e^{-\epsilon_1 t}) + T_{14}^0 e^{-\epsilon_1 t}$$

If we take $t$ such that $e^{-\epsilon_1 t} = \frac{1}{2}$ it results

$$T_{14} \geq \frac{1}{(a_{14}^{(1)}) (m)^{(1)}} \times t = \log \frac{2}{\epsilon_1}$$

By taking now $\epsilon_1$ sufficiently small one sees that $T_{14}$ is unbounded. The same property holds for $T_{15}$ if $\lim_{t \to \infty} ((b_{ii}^{(2)}) (G(t), t)) = (b_{ii}^{(2)})$

We now state a more precise theorem about the behaviors at infinity of the solutions.*295

$*296$

It is now sufficient to take $\frac{(a_{ii}^{(2)})}{(M_{16})^{(2)}} < 1$ and to choose

$$P_{16}(2)$$

and $Q_{16}(2)$ large to have.*297

$$\frac{(a_{ii}^{(2)})}{(M_{16})^{(2)}} \left( P_{16}(2) + (Q_{16}(2)) + G_{j}^{0} e^{-\frac{(P_{16}(2) + G_{j}^{0})}{T_{j}^{0}}} \right) \leq (Q_{16}(2)) \leq (Q_{16}(2))$$

$$\frac{(b_{ii}^{(2)})}{(M_{16})^{(2)}} \left( (Q_{16}(2)) + T_{j}^{0} e^{-\frac{(P_{16}(2) + G_{j}^{0})}{T_{j}^{0}}} \right) \leq (Q_{16}(2))$$

In order that the operator $\mathcal{A}$ transforms the space of sextuples of functions $G_i$, $T_i$ satisfying *300

The operator $\mathcal{A}$ is a contraction with respect to the metric

$$d \left( (G_{10}(1), (T_{10}(1), (G_{10}(2), (T_{10}(2)))), \right) =$$

$$\sup_{i \in \mathbb{R}^{+}} \max \left[ |G_{i}^{(1)}(t) - G_{i}^{(2)}(t)| e^{-((M_{16})^{(2)} t)} \max \left[ T_{i}^{(1)}(t) - T_{i}^{(2)}(t) \right] e^{-((M_{16})^{(2)} t)} \right]$$

Indeed if we denote

**Definition of** $\mathfrak{G}_{10}, \mathcal{F}_{10}$:

$$\mathfrak{G}_{10}, \mathcal{F}_{10} = \mathcal{A}(2)(G_{10}, T_{10})$$

It results

$$\mathfrak{G}_{10}(1) - G_{10}^{(2)}(1) \leq \int_{0}^{t} \left[ a_{10}^{(1)}(1) \right] G_{10}^{(1)} - a_{10}^{(2)}(1) \left| e^{-((M_{16})^{(2)} t) \times 1 e^{-((M_{16})^{(2)} t) \times 1}} dS_{10} \right.$$
\[
\left| (G_{19}(1) - G_{19}(2)) e^{-\left( M_{16}(2) \right)^2 t} \right| \leq \frac{1}{(M_{16}(2)^2)} \left( (a_{16}(1) + (a_{16}(1) + (A_{16}(1) + (P_{16}(0) + (Q_{16}(0))))\Delta (G_{19}(1), (T_{19}(1), (G_{19}(2), (T_{19}(2))) \right) *305 \\
\]

And analogous inequalities for \( G_r \) and \( T_r \). Taking into account the hypothesis the result follows *306

**Remark 1:** The fact that we supposed \((a'_{16}(2) \text{ and } (b'_{16}(2) \text{ depending also on } t \text{ can be considered as not conformal with the reality, however we have put this hypothesis in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by \((\bar{P}_{16}(0))e^{(\bar{M}_{16}(1)^2) t} \text{ and } (\bar{Q}_{16}(0))e^{(\bar{M}_{16}(1)^2) t} \text{ respectively of } \mathbb{R}_+.

If instead of proving the existence of the solution on \( \mathbb{R}_+ \), we have to prove it only on a compact then it suffices to consider \((a'_{i}(2) \text{ and } (b'_{i}(2), i = 16, 17, 18 \text{ depend only on } T_{i} \text{ and respectively on } (G_{i})\text{and not on } t \text{ and hypothesis can replaced by a usual Lipschitz condition.} *307

**Remark 2:** There does not exist any \( t \) where \( G_{i}(t) = 0 \) and \( T_{i}(t) = 0 \). From 19 to 24 it results

\[
G_{i}(t) \geq G_{i}^{0} \left[ \int_{0}^{t} |(a_{16}'(2) - a_{16}''(2)(T_{16}(t), T_{16}(t))| dt \right] \geq 0
\]

**Definition of** \((\bar{M}_{16}(2))_{1, 2}(\bar{M}_{16}(2))_{2} \text{ and } (\bar{M}_{16}(2))_{3}:

**Remark 3:** If \( G_{16} \) is bounded, the same property have also \( G_{17} \) and \( G_{18} \). Indeed if \( G_{16} < (\bar{M}_{16}(2)) \) it follows \( \frac{G_{16}}{dt} \leq (\bar{M}_{16}(2)) - (a_{17})^{2}G_{17} \) and by integrating

\[
G_{17} \leq (\bar{M}_{16}(2))_{2} = G_{17}^{0} + 2(a_{17})^{2}(\bar{M}_{16}(2))_{2}/(a_{17})^{2}
\]

In the same way, one can obtain

\[
G_{18} \leq (\bar{M}_{16}(2))_{3} = G_{18}^{0} + 2(a_{18})^{2}(\bar{M}_{16}(2))_{2}/(a_{18})^{2}
\]

If \( G_{17} \) or \( G_{18} \) is bounded the same property follows for \( G_{16}, G_{18} \) and \( G_{16}, G_{17} \) respectively. *309

**Remark 4:** If \( G_{16} \) is bounded, from below, the same property holds for \( G_{17} \) and \( G_{18} \). The proof is analogous with the preceding one. An analogous property is true if \( G_{17} \) is bounded from below.*311

**Definition of** \((m)^{2}(2) \text{ and } \varepsilon_{2}:

\[
\text{Remark 4: If } G_{16} \text{ is bounded, from below, the same property holds for } G_{17} \text{ and } G_{18} \text{. The proof is analogous with the preceding one. An analogous property is true if } G_{17} \text{ is bounded from below.} *311
\]

**Remark 5:** If \( T_{16} \) is bounded from below and \( \lim_{t \to \infty} ((b'_{16}(2))^{2}(G_{16}(t), t)) = (b_{17}(2)^{2}(t) \text{ then } T_{17} \to \infty.

**Definition of** \((m)(2) \text{ and } \varepsilon_{2}:

\[
\text{Indeed let } t_{2} \text{ be so that for } t > t_{2} \text{ (b_{17}(2))^{2} - (b_{17}(2))^{2}(G_{16}(t), t) < \varepsilon_{2}, T_{16}(t) > (m)^{2}(2) *312
\]

Then \( \frac{dT_{17}}{dt} \geq (a_{17})^{2}(m)^{2} - \varepsilon_{2}T_{17} \) which leads to

\[
T_{17} \geq \left( \frac{(a_{17})^{2}(m)^{2}}{\varepsilon_{2}} \right) \left( 1 - e^{-\varepsilon_{2} t} \right) + T_{17}^{0} e^{-\varepsilon_{2} t}
\]

If we take \( t \) such that \( e^{-\varepsilon_{2} t} = \frac{1}{2} \) it results *313

\[
T_{17} \geq \left( \frac{(a_{17})^{2}(m)^{2}}{\varepsilon_{2}} \right), \quad \varepsilon_{2} = \log_{2} \left( \frac{2}{\varepsilon_{2}} \right)
\]

By taking now \( \varepsilon_{2} \) sufficiently small one sees that \( T_{17} \) is unbounded. The same property holds for \( T_{18} \) if \( \lim_{t \to \infty} ((b'_{16}(2))^{2}(G_{16}(t), t)) = (b_{18}(2))^{2}
\]

We now state a more precise theorem about the behaviors at infinity of the solutions *314

\[
*315
\]

It is now sufficient to take \( (a_{j})^{(3)}(m_{20})^{(3)}(b_{j})^{(3)}(m_{20})^{(3)} < 1 \text{ and to choose}
\]

\[
(P_{20}(3))^{(3)}(Q_{20}(3))^{(3)} \text{ large to have *316}
\]

\[
\left( \begin{array}{c}
(a_{j})^{(3)}(m_{20})^{(3)}(b_{j})^{(3)}(m_{20})^{(3)} \\
(P_{20}(3))^{(3)}(Q_{20}(3))^{(3)}
\end{array} \right) e^{-\frac{(P_{20}(3))^{(3)} + (Q_{20}(3))^{(3)}}{T_{j}^{(3)}}} \leq (P_{20}(3))^{(3)} *317
\]

\[
\left( \begin{array}{c}
(b_{j})^{(3)}(m_{20})^{(3)}(b_{j})^{(3)}(m_{20})^{(3)} \\
(Q_{20}(3))^{(3)} \end{array} \right) e^{-\frac{(Q_{20}(3))^{(3)} + (P_{20}(3))^{(3)}}{T_{j}^{(3)}}} + (Q_{20}(3))^{(3)} *318
\]

In order that the operator \( A^{(3)} \) transforms the space of sextuples of functions \( G_{i}, T_{i} \) into itself!*319

The operator \( A^{(3)} \) is a contraction with respect to the metric

\[
d \left( (G_{23}(1), (T_{23}(1)), (G_{23}(2), (T_{23}(2))) \right) =
\]

85
Indeed if we denote
\[\sup_{t \in \mathbb{R}_+} |G_i^{(1)}(t) - G_i^{(2)}(t)| e^{-\langle M_0(\gamma) \rangle t} \leq \max_{t \in \mathbb{R}_+} |P_i^{(1)}(t) - T_i^{(2)}(t)| e^{-\langle M_0(\gamma) \rangle t} \]

\*320

Indeed if we denote

**Definition of** \( G_{23}, P_{23} : (G_{23}, (T_{23})) = \mathcal{A}(G_{23}, (T_{23}))*321 

It results

\[\int_0^t \left( (a_1''(\gamma)^{(3)}) \right)^3 |G_{20}^{(1)}(\gamma) - G_{20}^{(2)}(\gamma)| e^{-\langle M_0(\gamma) \rangle \langle x(\gamma) \rangle \delta(\gamma)} ds(\gamma) + \]

\[\int_0^t \left( (a_2''(\gamma)^{(3)}) \right)^3 |G_{20}^{(1)}(\gamma) - G_{20}^{(2)}(\gamma)| e^{-\langle M_0(\gamma) \rangle \langle x(\gamma) \rangle \delta(\gamma)} + \]

\[\int_0^t \left( (a_3''(\gamma)^{(3)}) \right)^3 \] Where \( s(\gamma) \) represents integrand that is integrated over the interval \([0, t]\)

From the hypotheses it follows*322

\[G_{20}^{(1)}(\gamma) - G_{20}^{(2)}(\gamma) e^{-\langle M_0(\gamma) \rangle t} \leq \]

\[\frac{1}{\langle M_0(\gamma) \rangle^3} \left( (a_1''(\gamma)^{(3)} + (a_2''(\gamma)^{(3)} + (a_3''(\gamma)^{(3)} \right) \right) \]

And analogous inequalities for \( T_{21} \)

**Remark 1:** The fact that we supposed \((a_1''(\gamma)^{(3)} + (a_2''(\gamma)^{(3} + (a_3''(\gamma)^{(3}) \gamma > 0 \), we can be considered as not conformal with the reality, however we have put this hypothesis in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by \((P_{20}) e^{(M_0(\gamma)) t} \) and \((Q_{20}) e^{(M_0(\gamma)) t} \) respectively of \( \mathbb{R}_+ \).

If instead of proving the existence of the solution on \( \mathbb{R}_+ \), we have to prove it only on a compact then it suffices to consider that \((a_1''(\gamma)^{(3)} + (a_2''(\gamma)^{(3} + (a_3''(\gamma)^{(3}) \gamma > 0 \), we can be considered as not conformal with the reality, however we have put this hypothesis in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by \((P_{20}) e^{(M_0(\gamma)) t} \) and \((Q_{20}) e^{(M_0(\gamma)) t} \) respectively of \( \mathbb{R}_+ \).

**Remark 2:** There does not exist any \( t \) where \( G_{20}(t) = 0 \) and \( T_{21}(t) = 0 \)

From 19 to 24 it results

\[G_{20}(t) \geq G_{20}^0 e^{-\int_{t_0}^t (a_1''(\gamma)^{(3)} - \langle M_0(\gamma) \rangle \langle x(\gamma) \rangle \delta(\gamma)) ds(\gamma)} \geq 0 \]

\[T_{21}(t) \geq T_{21}^0 e^{-\langle M_0(\gamma) \rangle t} > 0 \] for \( t > 0 *326 

**Definition of** \((\overline{M}_{20})^{(3)} \), \((\overline{M}_{20})^{(2)} \) and \((\overline{M}_{20})^{(3)} \) :

**Remark 3:** If \( G_{20} \) is bounded, the same property have also \( G_{21} \) and \( G_{22} \) . Indeed if

\[G_{20} < \overline{M}_{20}^{(3)} \text{it follows} \frac{dG_{20}}{dt} \leq (\overline{M}_{20}^{(3)} - (a_1''(\gamma)^{(3)}) G_{21} \text{and by integrating}

\[G_{21} \leq (\overline{M}_{20}^{(3)})_1 = \frac{G_{20}^0}{(a_2''(\gamma)^{(3)})}_1 + (a_3''(\gamma)^{(3)}) \]

In the same way , one can obtain

\[G_{22} \leq (\overline{M}_{20}^{(3)})_2 \leq \frac{G_{20}^0}{(a_2''(\gamma)^{(3)})}_2 + (a_3''(\gamma)^{(3)}) \]

If \( G_{21} \) or \( G_{22} \) is bounded, the same property follows for \( G_{20} \), \( G_{22} \) and \( G_{20} \), \( G_{21} \) respectively.*327

**Remark 4:** If \( G_{20} \) is bounded, from below, the same property holds for \( G_{21} \) and \( G_{22} \). The proof is analogous with the preceding one. An analogous property is true if \( G_{21} \) is bounded from below. *328

**Remark 5:** If \( T_{20} \) is bounded from below and \( \lim_{t \to \infty} (b_1''(\gamma)^{(3)} (G_{23}(t), t) = (b_1''(\gamma)^{(3}) \) then \( T_{21} \to \infty \).

**Definition of** \((m)(3) \) and \( \varepsilon_3 \) :

Indeed let \( \varepsilon_3 \) be so that for \( t > t_3 \)

\[(b_{21}(\gamma)^{(3}) - (b_2''(\gamma)^{(3})(G_{23}(t), t) < \varepsilon_3 T_{20} (t) > (m)(3) *329 

330

Then \( \frac{dT_{21}}{dt} \geq (a_{21}(\gamma)^{(3)(m)(3)} - \varepsilon_3 T_{21} \) which leads to

\[T_{21} \geq \left( (a_{21}(\gamma)^{(3)(m)(3)} - \varepsilon_3 T_{21} \right) \left( 1 - e^{-\varepsilon_3 t} \right) + T_{21}^0 e^{-\varepsilon_3 t} \] If we take \( t \) such that \( e^{-\varepsilon_3 t} \leq \frac{1}{2} \) it results

\[T_{21} \geq \left( (a_{21}(\gamma)^{(3)(m)(3)} - \varepsilon_3 T_{21} \right) \left( 1 - e^{-\varepsilon_3 t} \right) + T_{21}^0 e^{-\varepsilon_3 t} \] By taking now \( \varepsilon_3 \) sufficiently small one sees that \( T_{21} \) is unbounded. The same property holds for \( T_{22} \) if \( \lim_{t \to \infty} (b_2''(\gamma)^{(3)} (G_{23}(t), t) = (b_2''(\gamma)^{(3}) \)

We now state a more precise theorem about the behaviors at infinity of the solutions *331 *332

It is now sufficient to take \( (a_{21}(\gamma)^{(4)(4)) (m)(4) < 1 \) and to choose

\((P_{24})^{(4)} \) and \((Q_{24})^{(4)} \) large to have*333

86
In order that the operator $\mathcal{A}^{(4)}$ transforms the space of sextuples of functions $G_i, T_i$ satisfying $\text{IN}$ to itself*336

The operator $\mathcal{A}^{(4)}$ is a contraction with respect to the metric

$$
d \left( (G_27, (T_22), (T_22)) \right) = \sup \left( \max_{t \in \mathbb{R}_+} \left| G_i^{(1)} (t) - G_i^{(2)} (t) \right| e^{-M_{24}(4)}, \max_{t \in \mathbb{R}_+} \left| T_i^{(1)} (t) - T_i^{(2)} (t) \right| e^{-M_{24}(4)} \right)
$$

Indeed if we denote

**Definition of $\mathcal{G}_{27}$, $\mathcal{T}_{22}$**: $\left( \mathcal{G}_{27}, \mathcal{T}_{27} \right) = \mathcal{A}^{(4)}((G_27), (T_22))$

It results

$$
\left| G_27^{(1)} - G_27^{(2)} \right| \leq \int_0^t \left| G_25^{(1)} - G_25^{(2)} \right| e^{-M_{24}(4)x_{24}(4)} e^{M_{24}(4)x_{24}(4)} dS_{24} + 
\int_0^t \left| a_{24}^{(1)} - a_{24}^{(2)} \right| e^{-M_{24}(4)x_{24}(4)} e^{M_{24}(4)x_{24}(4)} + 
\int_0^t \left| a''_{24}^{(1)}(T_{25}^{(1)} - T_{25}^{(2)}) \right| e^{-M_{24}(4)x_{24}(4)} e^{M_{24}(4)x_{24}(4)} + 
\int_0^t \left| a''_{24}^{(2)}(T_{25}^{(2)} - T_{25}^{(1)}) \right| e^{-M_{24}(4)x_{24}(4)} e^{M_{24}(4)x_{24}(4)}
$$

Where $S_{24}$ represents integrand that is integrated over the interval $[0, t]$

From the hypotheses it follows*337

338

$$
\left| (G_27^{(1)} - G_27^{(2)}) e^{-M_{24}(4)t} \right| \leq \left( \left| G_24^{(1)} + (a_{24}^{(1)} + (G_24^{(1)}(T_{24}^{(1)} - T_{24}^{(2)})) \right) d \left( (G_27^{(1)}, (T_22^{(1)}), (T_22^{(2)})) \right)
$$

And analogous inequalities for $G_i$ and $T_i$. Taking into account the hypothesis the result follows*339

**Remark 1**: The fact that we supposed $(a_{24}^{(1)}$ and $(b_{24}^{(1)}$ depending also on $t$ can be considered as not conformal with the reality, however we have put this hypothesis in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by $(G_24) e^{M_{24}(4)t}$ and $(\tilde{G}_24) e^{M_{24}(4)t}$ respectively of $\mathbb{R}_+$.

If instead of proving the existence of the solution on $\mathbb{R}_+$, we have to prove it only on a compact then it suffices to consider that $(a''_{24})$ and $(b''_{24}, i = 24, 25, 26$ depend only on $T_25$ and respectively on $(G_27)$ and respectively $t$, and hypothesis can replaced by a usual Lipschitz condition.*340

**Remark 2**: There does not exist any $t$ where $G_i (t) = 0$ and $T_i (t) = 0$

From 19 to 24 it results

$$
G_i (t) \geq G_0 \ e^{-\int_0^t \left| a_{24}^{(1)} - (a''_{24}) (T_{24}(s_{24}), x_{24}(s_{24})) \right| ds_{24}} \geq 0
$$

$$
T_i (t) \geq T_0 \ e^{-\epsilon_4 t} \geq 0 \ for \ t > 0^*341
$$

**Definition of $(\tilde{M}_{24})^{(1)}, (\tilde{M}_{24})^{(2)}$ and $(\tilde{M}_{24})^{(4)}$**:

**Remark 3**: if $G_{24}$ is bounded, the same property have also $G_{25}$ and $G_{26}$ - indeed if $G_{24} < (\tilde{M}_{24})^{(4)}$ it follows $\frac{dG_{25}}{dt} \leq (\tilde{M}_{24})^{(4)} - (a_{25})^{(4)} G_{25}$ and by integrating

$$
G_{25} \leq (\tilde{M}_{24})^{(4)} + \frac{2(a_{25})^{(4)}}{a_{25}^{(4)}} \int a_{24}^{(4)}
$$

In the same way , one can obtain

$$
G_{26} \leq (\tilde{M}_{24})^{(4)} + (a_{26}^{(4)})^{(4)} - (a_{26}^{(4)})^{(4)}
$$

If $G_{25}$ or $G_{26}$ is bounded, the same property follows for $G_{24}, G_{25}$ and $G_{26}, G_{24}$ respectively.*342

**Remark 4**: if $G_{24}$ is bounded, from below, the same property holds for $G_{25}$ and $G_{26}$. The proof is analogous with the preceding one. An analogous property is true if $G_{25}$ is bounded from below.*343

**Remark 5**: if $\tilde{T}_{25}$ is bounded from below and $\lim_{t \to \infty} \left| \left( b_{25}^{(4)} (\tilde{T}_{25}(t), t) \right) \right| = (b_{25}^{(4)})$ then $\tilde{T}_{25} \to \infty$

**Definition of $(m)^{(4)}$ and $\epsilon_4$**:

Indeed let $t_4$ and $t_5$ be so that for $t > t_4$

$b_{25}^{(4)} - (b_{25}^{(4)}) (\tilde{T}_{25}(t), t) < \epsilon_4 T_{25}(t) > (m)^{(4)}\geq 334$

Then $\frac{dT_{25}}{dt} \geq (a_{25})^{(4)}(m)^{(4)} - \epsilon_4 T_{25}$ which leads to

$$
T_{25} \geq \frac{(a_{25})^{(4)}(m)^{(4)}(1 - e^{-\epsilon_4 t}) + T_{25} e^{-\epsilon_4 t}}{\epsilon_4}
$$

If we take $t$ such that $e^{-\epsilon_4 t} = \frac{1}{2}$ it results

87
By taking now sufficiently small one sees that is unbounded. The same property holds for if 

We now state a more precise theorem about the behaviors at infinity of the solutions ANALOGOUS inequalities hold also for 

It is now sufficient to take and to choose large to have

In order that the operator transforms the space of sextuples of functions into itself the operator is a contraction with respect to the metric

Indeed if we denote

It results

Where represents integrand that is integrated over the interval From the hypotheses it follows And analogous inequalities for taking into account the hypothesis (35,35,36) the result follows

Remark 1: The fact that we supposed depending also on can be considered as not conformal with the reality, however we have put this hypothesis ,in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by respectively of If instead of proving the existence of the solution on we have to prove it only on a compact then it suffices to consider that and hypothesis can replaced by a usual Lipschitz condition.

Remark 2: There does not exist any where From GLOBAL EQUATIONS it results

And by integrating

In the same way , one can obtain

If is bounded, the same property follows for and respectively.
Remark 4: If \( G_{29} \) is bounded, from below, the same property holds for \( G_{29} \) and \( G_{30} \). The proof is analogous with the preceding one. An analogous property is true if \( G_{29} \) is bounded from below.

Remark 5: If \( T_{29} \) is bounded from below and \( \lim_{t \to \infty} ((b')_{s}^{(5)} ((G_{31})(t), t)) = (b'_{29})^{(5)} \) then \( T_{29} \to \infty \).

Definition of \((m)^{(5)}\) and \( \varepsilon_{5} \):

Indeed let \( \varepsilon_{5} \) be so that for \( t > \varepsilon_{5} \)

\[
(b_{29})^{(5)} - (b')^{(5)} ((G_{31})(t), t) < \varepsilon_{5}, T_{29} (t) > (m)^{(5)} \geq 358
\]

Then \( \frac{dT_{29}}{dt} \geq (a_{29})^{(5)}(m)^{(5)} - \varepsilon_{5} T_{29} \) which leads to

\[
T_{29} \geq \left( \frac{(a_{29})^{(5)}(m)^{(5)} \varepsilon_{5}}{2} \right) 1 - e^{-\varepsilon_{5} t} + T_{29}^{0} e^{-\varepsilon_{5} t} \quad \text{If we take } t \text{ such that } e^{-\varepsilon_{5} t} = \frac{1}{2} \text{ it results}
\]

\[
T_{29} \geq \left( \frac{(a_{29})^{(5)}(m)^{(5)} \varepsilon_{5}}{2} \right) t = \log \frac{2}{\varepsilon_{5}} \quad \text{By taking now } \varepsilon_{5} \text{ sufficiently small one sees that } T_{29} \text{ is unbounded. The same property holds for } T_{30} \text{ if } \lim_{t \to \infty} ((b'_{30})^{(5)} ((G_{31})(t), t)) = (b'_{30})^{(5)}
\]

We now state a more precise theorem about the behaviors at infinity of the solutions

Analogous inequalities hold also for \( G_{33}, G_{34}, T_{32}, T_{33}, T_{34} \).

It is now sufficient to take \( \frac{(a_{32})^{(6)}}{(G_{32})^{(6)}} \), \( \frac{(b_{32})^{(6)}}{(G_{32})^{(6)}} \) large to have

\[
\frac{(a_{32})^{(6)}}{(G_{32})^{(6)}} \quad \frac{(b_{32})^{(6)}}{(G_{32})^{(6)}}\]

Then

\[
\left( (\hat{P}_{32})^{(6)} + \left( (\hat{P}_{32})^{(6)} + G_{32}^{0} e^{-\frac{(\hat{P}_{32})^{(6)} + G_{32}^{0}}{\bar{G}_{32}^{0}}} \right) \right) \leq (\hat{P}_{32})^{(6)} + \frac{1}{363}
\]

\[
\left( (\hat{Q}_{32})^{(6)} + \left( (\hat{Q}_{32})^{(6)} + T_{32}^{0} e^{-\frac{(\hat{Q}_{32})^{(6)} + T_{32}^{0}}{\bar{Q}_{32}^{0}}} \right) \right) \leq (\hat{Q}_{32})^{(6)} + \frac{1}{364}
\]

In order that the operator \( \mathcal{A}^{(6)} \) transforms the space of sextuples of functions \( G_{i}, T_{i} \) into itself

The operator \( \mathcal{A}^{(6)} \) is a contraction with respect to the metric

\[
d \left( (G_{35}^{(1)}, (T_{35}^{(1)}), (G_{35}^{(2)}, (T_{35}^{(2)})) \right) = \sup_{i \in \mathbb{R}_{+}} \left[ \left( G_{i}^{(1)}(t) - G_{i}^{(2)}(t) \right) e^{-\frac{(G_{32})^{(6)} t}{\bar{G}_{32}^{0}}} \left( \max_{t \in \mathbb{R}_{+}} \left| T_{i}^{(1)}(t) - T_{i}^{(2)}(t) \right| e^{-\frac{(T_{32})^{(6)} t}{\bar{T}_{32}^{0}}} \right) \right]
\]

Indeed if we denote

Definition of \((G_{35}), (T_{35}) : (G_{35}, (T_{35})) = \mathcal{A}^{(6)}((G_{35}), (T_{35}))

It results

\[
\left| G_{32}^{(1)} - \tilde{G}_{32}^{(1)} \right| \leq \int_{0}^{t} (a_{32}^{(6)})^{6} \left| G_{33}^{(1)} - G_{33}^{(2)} \right| e^{-\frac{(G_{32})^{(6)} t}{\bar{G}_{32}^{0}}} e\left(\tilde{G}_{32}^{(6)} \right) dS_{32} + \frac{1}{366} \int_{0}^{t} (a_{32}^{(6)})^{6} (G_{32}^{(2)})^{6} \left| G_{32}^{(1)} - G_{32}^{(2)} \right| e^{-\frac{(G_{32})^{(6)} t}{\bar{G}_{32}^{0}}} e\left(\tilde{G}_{32}^{(6)} \right) dS_{32} + \frac{1}{367} \int_{0}^{t} (a_{32}^{(6)})^{6} (T_{32}^{(1)} + S_{32}^{(3)}) \left| G_{32}^{(1)} - G_{32}^{(2)} \right| e^{-\frac{(G_{32})^{(6)} t}{\bar{G}_{32}^{0}}} e\left(\tilde{G}_{32}^{(6)} \right) dS_{32} + \frac{1}{368} \int_{0}^{t} (a_{32}^{(6)})^{6} (T_{32}^{(2)} + S_{32}^{(3)}) \left| G_{32}^{(1)} - G_{32}^{(2)} \right| e^{-\frac{(G_{32})^{(6)} t}{\bar{G}_{32}^{0}}} e\left(\tilde{G}_{32}^{(6)} \right) dS_{32}
\]

Where \( S_{32} \) represents integral that is integrated over the interval \([0, t] \)

From the hypotheses it follows

\[
\left| (G_{35}^{(1)} - (G_{35}^{(2)})^{6} t \leq \frac{1}{366} \left( (a_{32}^{(6)})^{6} + (a_{32}^{(6)})^{6} + (\bar{G}_{32}^{(6)} + (\bar{P}_{32}^{(6)} + \bar{Q}_{32}^{(6)})) d \left( (G_{35}^{(1)}, (T_{35}^{(1)}); (G_{35}^{(2)}, (T_{35}^{(2)})) \right) \right)\right.
\]

And analogous inequalities for \( G_{i} \) and \( T_{i} \). Taking into account the hypothesis the result follows

Remark 1: The fact that we supposed \( (a_{32}^{(6)})^{6} \), \( (b_{32}^{(6)})^{6} \) depending also on \( t \) can be considered as not conformal with the reality, however we have put this hypothesis in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by \( (P_{32})^{6} e^{(R_{32})^{6} t} \) and \( (\bar{Q}_{32})^{6} e^{(R_{32})^{6} t} \) respectively of \( \mathbb{R}_{+} \).

If instead of proving the existence of the solution on \( \mathbb{R}_{+} \), we have to prove it only on a compact then it suffices to consider that \( (a'_{32}^{(6)})^{6} \) and \( (b'_{32}^{(6)})^{6} \) depend only on \( T_{32} \) and respectively on \( (G_{35}) \) and \( (T_{35}) \) and hypothesis can replaced by a usual Lipschitz condition.

Remark 2: There does not exist any \( t \) where \( G_{i} (t) = 0 \) and \( T_{i} (t) = 0 \)

From 69 to 32 it results

89
$G_i(t) \geq G_i^0 e^{-\frac{\delta \tau}{2} \left[ (a_{i1}^{(6)})^2 + (a_{i2}^{(6)})^2 \right]} \geq 0$

$T_i(t) \geq T_i^0 e^{-\frac{\delta \tau}{2} t} > 0 \text{ for } t > 0$.*370

**Definition of** $(\mathcal{M}_{32}^{(6)})_1$, $(\mathcal{M}_{32}^{(6)})_2$ and $(\mathcal{M}_{32}^{(6)})_3$:

**Remark 3:** if $G_{32}$ is bounded, the same property has also $G_{33}$ and $G_{34}$ - indeed if

$G_{32} < (\mathcal{M}_{32}^{(6)})_3$ it follows $\frac{dG_{32}}{dt} \leq (\mathcal{M}_{32}^{(6)})_2 - (a_{33}^{(6)})G_{33}$ and by integrating

$G_{32} \leq (\mathcal{M}_{32}^{(6)})_2 + (a_{33}^{(6)})G_{33}$. In the same way, one can obtain

$G_{34} \leq (\mathcal{M}_{32}^{(6)})_3 + (a_{33}^{(6)})G_{33}$. If $G_{34}$ or $G_{32}$ is bounded, the same property follows for $G_{32}$, $G_{44}$ and $G_{32}$, $G_{33}$ respectively.*371

**Remark 4:** If $G_{32}$ is bounded, from below, the same property holds for $G_{33}$ and $G_{34}$. The proof is analogous with the preceding one. An analogous property is true if $G_{33}$ is bounded from below.*372

**Remark 5:** If $T_{32}$ is bounded from below and $\lim_{t \to \infty} (b_{33}^{(6)}((G_{33}(t), t)) = (b_{33}^{(6)})$ then $T_{33} \to \infty$.

**Definition of** $(m)^{(6)}$ and $\varepsilon_6$:

Indeed let $\varepsilon_6$ be so that for $t > t_6$

$$(b_{33}^{(6)} - (b_{33}^{(6)})^((G_{33}(t), t)) < \varepsilon_6 \text{ for } t > t_6$$

Then

$$\frac{dG_{33}}{dt} \geq (a_{33}^{(6)})^2 (m)^{(6)} - \varepsilon_6 \text{ which leads to}

T_{33} \geq (a_{33}^{(6)})^2 \frac{(m)^{(6)}}{\varepsilon_6} \left( 1 - e^{-\varepsilon_6 t} \right) + T_{33}^0 e^{-\varepsilon_6 t} \text{ if we take } t \text{ such that } e^{-\varepsilon_6 t} = \frac{1}{2} \text{ it results}

T_{33} \geq (a_{33}^{(6)})^2 \frac{(m)^{(6)}}{\varepsilon_6} \text{, } t = \log \frac{2}{\varepsilon_6} \text{ By taking now } \varepsilon_6 \text{ sufficiently small one sees that } T_{33} \text{ is unbounded. The same property holds for } T_{34} \text{ if } \lim_{t \to \infty} (b_{34}^{(6)}((G_{33}(t), t)(t), t) = (b_{34}^{(6)})^{(6)}

We now state a more precise theorem about the behaviors at infinity of the solutions.*375*376

**Behavior of the solutions**

If we denote and define

**Definition of** $(\sigma_1)^{(1)}, (\sigma_2)^{(1)}, (\tau_1)^{(1)}, (\tau_2)^{(1)}$:

(a) $(\sigma_1)^{(1)}, (\sigma_2)^{(1)}, (\tau_1)^{(1)}, (\tau_2)^{(1)}$ four constants satisfying

$-(\sigma_2)^{(1)} \leq -(a_{13}^{(1)}) + (a_{14}^{(1)}) + (a_{13}^{(1)})^2 (T_{14}, t) + (a_{13}^{(1)})(T_{14}, t) \leq -(\sigma_1)^{(1)}$

$-(\tau_2)^{(1)} \leq -(b_{13}^{(1)}) + (b_{14}^{(1)}) - (b_{14}^{(1)}) (G(t), t) - (b_{14}^{(1)}) (G, t) \leq -(\tau_1)^{(1)}$

**Definition of** $(\nu_1)^{(1)}, (\nu_2)^{(1)}, (u_1)^{(1)}, (u_2)^{(1)}, (v_1)^{(1)}, (u_2)^{(1)}$:

By $(\nu_1)^{(1)} > 0, (\nu_2)^{(1)} < 0$ and respectively $(u_1)^{(1)} > 0, (u_2)^{(1)} < 0$ the roots of the equations

$$(a_{14}^{(1)}(v_1)^2) + (a_{13}^{(1)}(v_1)^2) - (a_{13}^{(1)})^2 v_1^{(1)} + (b_{14}^{(1)}(u_1)^2) + (b_{14}^{(1)}(u_1)^2) - (b_{14}^{(1)})^2 (G, t) \leq (\tau_1)^{(1)} \times 377$$

**Definition of** $(\tilde{v}_1)^{(1)}, (\tilde{v}_2)^{(1)}$, $(\tilde{u}_1)^{(1)}, (\tilde{u}_2)^{(1)}$:

By $(\tilde{v}_1)^{(1)} > 0, (\tilde{v}_2)^{(1)} < 0$ and respectively $(\tilde{u}_1)^{(1)} > 0, (\tilde{u}_2)^{(1)} < 0$ the roots of the equations

$$(a_{14}^{(1)}(v_1)^2) + (a_{13}^{(1)}(v_1)^2) - (a_{13}^{(1)})^2 v_1^{(1)} + (b_{14}^{(1)}(u_1)^2) + (b_{14}^{(1)}(u_1)^2) - (b_{14}^{(1)})^2 (G, t) \leq (\tau_1)^{(1)}$$

**Definition of** $(m_1)^{(1)}, (m_2)^{(1)}, (\tilde{\mu}_1)^{(1)}, (\tilde{\mu}_2)^{(1)}, (\nu_0)^{(1)}$:

(b) If we define $(m_1)^{(1)}, (m_2)^{(1)}, (\tilde{\mu}_1)^{(1)}, (\tilde{\mu}_2)^{(1)}$, by

$$(m_2)^{(1)} = (v_0)^{(1)}, (m_1)^{(1)} = (v_1)^{(1)} \text{ if } (v_0)^{(1)} < (v_1)^{(1)}$$

which leads to

$$(\nu_0)^{(1)} = \frac{\delta_{v_1}^{(1)}}{\delta_{v_1}^{(1)}}$$

and analogously

$$(m_2)^{(1)} = (v_1)^{(1)}, (m_1)^{(1)} = (v_0)^{(1)} \text{ if } (v_1)^{(1)} < (v_0)^{(1)}$$

$$(\nu_0)^{(1)} = \frac{\delta_{v_1}^{(1)}}{\delta_{v_1}^{(1)}}$$

and analogously

$$(m_2)^{(1)} = (v_1)^{(1)}, (m_1)^{(1)} = (v_0)^{(1)} \text{ if } (v_1)^{(1)} < (v_0)^{(1)}$$

$$(\nu_0)^{(1)} = \frac{\delta_{v_1}^{(1)}}{\delta_{v_1}^{(1)}}$$

are defined respectively.*381

Then the solution satisfies the inequalities

$$G_{13} e^{(S_1^{(1)} - 913^{(1)} t)} \leq G_{13}(t) \leq G_{13} e^{(S_1^{(1)} t)}$$
where \((p_1)^{(1)}\) is defined
\[
\frac{1}{(m_{12})^{(1)}} G_{12}^{0} e^{((S_1)^{(1)}-(p_{12})^{(1)})t} \leq G_{14}(t) \leq \frac{1}{(m_{23})^{(1)}} G_{13}^{0} e^{((S_1)^{(1)})t} \tag{383}
\]

\[
(\frac{1}{(m_{12})^{(1)}} G_{12}^{0} e^{((S_1)^{(1)}-(p_{12})^{(1)})t} - e^{-(S_2)^{(1)}t}) + G_{15}^{0} e^{-(S_2)^{(1)}t} \leq G_{15}(t) \leq \frac{1}{(m_{23})^{(1)}} G_{13}^{0} e^{((S_2)^{(1)})t} \tag{384}
\]

\[
\frac{1}{(m_{12})^{(1)}} G_{12}^{0} e^{((S_1)^{(1)}-(p_{12})^{(1)})t} - e^{-(a_{12})^{(1)}t} + G_{15}^{0} e^{-(a_{12})^{(1)}t} \geq \frac{1}{(m_{23})^{(1)}} G_{13}^{0} e^{((S_2)^{(1)}-(a_{12})^{(1)})t} \tag{385}
\]

\[
T_{10}^{0} e^{((R_1)^{(1)}+(r_{13})^{(1)})t} \leq T_{13}(t) \leq T_{10}^{0} e^{((R_1)^{(1)}+(r_{13})^{(1)})t} \tag{386}
\]

\[
(\frac{1}{(m_{12})^{(1)}} G_{12}^{0} e^{((R_1)^{(1)}+(r_{13})^{(1)})t} - e^{-(b_{10})^{(1)}t}) + T_{15}^{0} e^{-(b_{10})^{(1)}t} \leq T_{15}(t) \leq \frac{1}{(m_{23})^{(1)}} G_{13}^{0} e^{((R_1)^{(1)}+(r_{13})^{(1)})t} \tag{387}
\]

**Definition of \((S_1)^{(1)}\), \((S_2)^{(1)}\), \((R_1)^{(1)}\), \((R_2)^{(1)}\):**

Where \((S_1)^{(1)} = (a_{13})^{(1)}(m_2)^{(1)} - (a_{13})^{(1)}(S_2)^{(1)} = (a_{13})^{(1)} - (p_{15})\)

\((R_2)^{(1)} = (b_{13})^{(1)}(\mu_2)^{(1)} - (b_{13})^{(1)} \tag{388}\)

\((R_2)^{(1)} = (b_{13})^{(1)} - (r_{15})\)

**Behavior of the solutions**

If we denote and define \(a_{17}^{(2)}(v)^{(2)}\)

\[-(\sigma_1)^{(2)} \leq -a_{16}^{(2)} + a_1^{(2)} - a_{17}^{(2)}(\bar{v}_1)^{(2)} + (\bar{v}_1)^{(2)}(T_{17}, t) \leq -(\sigma_1)^{(2)} \tag{390}\]

\[-(\tau_1)^{(2)} \leq -b_{16}^{(2)} + b_1^{(2)} - b_{17}^{(2)} - (b_{16}^{(2)}(G_{19}), t) - (b_{17}^{(2)}(G_{19}), t) \leq -(\tau_1)^{(2)} \tag{391}\]

**Definition of \((v_1)^{(2)}\), \((v_2)^{(2)}\), \((u_1)^{(2)}\), \((u_2)^{(2)}\):**

By \((v_1)^{(2)} \geq 0, (v_2)^{(2)} < 0 \) respectively \((u_1)^{(2)} > 0, (u_2)^{(2)} < 0 \) the roots \(a^{(2)}_{17} = 0 \tag{392}\)

and \((b_{17})^{(2)}(u)^{(2)} \geq 0 \tag{393}\)

**Definition of \((v_1)^{(2)}\), \((v_2)^{(2)}\), \((u_1)^{(2)}\), \((u_2)^{(2)}\):**

By \((v_1)^{(2)} \geq 0, (v_2)^{(2)} < 0 \) respectively \((u_1)^{(2)} > 0, (u_2)^{(2)} < 0 \) the roots \(a^{(2)}_{17} = 0 \tag{394}\)

and \((b_{17})^{(2)}(u)^{(2)} \geq 0 \tag{395}\)

**Definition of \((m_{12})^{(2)}\), \((m_{23})^{(2)}\), \((\mu_1)^{(2)}\), \((\mu_2)^{(2)}\):**

If we define \((m_{12})^{(2)} = (v_1)^{(2)}(v_2)^{(2)}\), \((m_{23})^{(2)} = (v_1)^{(2)}(v_2)^{(2)}\), \((\mu_1)^{(2)} = (u_1)^{(2)}\), \((\mu_2)^{(2)} = (u_2)^{(2)} \tag{396}\)

**Definition of \((m_{12})^{(2)}\), \((m_{23})^{(2)}\), \((\mu_1)^{(2)}\), \((\mu_2)^{(2)}\):**

If we define \((m_{12})^{(2)} = (v_1)^{(2)}(v_2)^{(2)}\), \((m_{23})^{(2)} = (v_1)^{(2)}(v_2)^{(2)}\), \((\mu_1)^{(2)} = (u_1)^{(2)}\), \((\mu_2)^{(2)} = (u_2)^{(2)} \tag{397}\)

Then the solution satisfies the inequalities

\[
G_{16}^{0} e^{((S_1)^{(2)}-(p_{16})^{(2)})t} \leq G_{16}(t) \leq G_{16}^{0} e^{((S_1)^{(2)}t} \tag{398}\]

\[
G_{16}^{0} e^{((S_1)^{(2)}-(p_{16})^{(2)})t} \leq G_{17}(t) \leq \frac{1}{(m_{23})^{(2)}} G_{13}^{0} e^{((S_1)^{(2)})t} \tag{399}\]

\[
(\frac{1}{(m_{23})^{(2)}} G_{13}^{0} e^{((S_1)^{(2)}-(p_{16})^{(2)})t} - e^{-(S_2)^{(2)}t}) + G_{18}^{0} e^{-(S_2)^{(2)}t} \leq G_{18}(t) \leq \frac{1}{(m_{23})^{(2)}} G_{13}^{0} e^{((S_1)^{(2)}-(a_{12})^{(2)})t} \tag{400}\]

\[
(\frac{1}{(m_{23})^{(2)}} G_{13}^{0} e^{((S_1)^{(2)}-(a_{12})^{(2)})t} - e^{-(a_{12})^{(2)}t}) + G_{18}^{0} e^{-(a_{12})^{(2)}t} \geq G_{18}(t) \tag{401}\]

\[
T_{10}^{0} e^{((R_1)^{(2)}+(r_{13})^{(2)})t} \leq T_{10}^{0} e^{((R_1)^{(2)}+(r_{13})^{(2)})t} \tag{402}\]

91
\[
\frac{1}{(\mu_2)^2} T_{16}^0 (R_{16})^{(2)} t \leq \frac{1}{(\mu_2)^2} T_{16}^0 e^{e (R_{16})^{(2)} + (R_{16})^{(2)} t} \leq 413
\]
\[
\left(\frac{b_{16}}{(a_{16})^2} e^{(R_{16})^{(2)} + (R_{16})^{(2)} t} - e^{-(b_{16})^{(2)} t}\right) + T_{16}^0 e^{- (b_{16})^{(2)} t} \leq T_{16}^0 e^{- (R_{16})^{(2)} t} \leq 414
\]

**Definition of (S_1)^{(2)}, (S_2)^{(2)}, (R_1)^{(2)}, (R_2)^{(2)}:**

Where \((S_1)^{(2)} = (a_{16})^2 (m_2)^2 - (a_{16})^2 (a_{16})^2 \)
\((S_2)^{(2)} = (a_{16})^2 (p_{16})^2 + (b_{16})^{(2)} (a_{16})^2 \)
\((R_1)^{(2)} = (b_{16})^{(2)} (a_{16})^2 - (b_{16})^{(2)} (a_{16})^2 \)
\((R_2)^{(2)} = (b_{16})^{(2)} (a_{16})^2 - (p_{16})^2 \)

*415

**Behavior of the solutions**

If we denote and define

\[\sigma_3^{(3)}, \sigma_2^{(3)}, \tau_3^{(3)}, \tau_2^{(3)}\] four constants satisfying
\[-(\sigma_3^{(3)} - (a_{20}^{(3)})^2 (a_{20}^{(3)})^2 (T_{21})^2 (T_{21})^2) + (a_{20}^{(3)})^2 (T_{21})^2 \leq - (\sigma_3^{(3)} - (a_{20}^{(3)})^2 (a_{20}^{(3)})^2 (T_{21})^2)
\]
\[-(\tau_2^{(3)} - (b_{20}^{(3)})^2 (b_{20}^{(3)})^2 (G_{20})^2 (T_{21})^2) + (b_{20}^{(3)})^2 (G_{20})^2 (T_{21})^2 \leq - (\tau_2^{(3)} - (b_{20}^{(3)})^2 (b_{20}^{(3)})^2 (G_{20})^2)
\]

**Definition of \((v_1)^{(3)}, (v_2)^{(3)}, (u_1)^{(3)}, (u_2)^{(3)}\):**

\[(a_{21}^{(3)})^2 (v_1)^{(3)} + (\sigma_2^{(3)})^2 (v_1)^{(3)} - (a_{20}^{(3)})^2 = 0 \]
and \((b_{21}^{(3)})^2 (u_1)^{(3)} + (\tau_2^{(3)})^2 (u_1)^{(3)} - (b_{20}^{(3)})^2 = 0 \)

By \((v_1)^{(3)} > 0, (v_2)^{(3)} < 0\) and \((u_1)^{(3)} > 0, (u_2)^{(3)} < 0\)

**Definition of \((m_1)^{(3)}, (m_2)^{(3)}, (\mu_1)^{(3)}, (\mu_2)^{(3)}\):**

\[(m_2)^{(3)} = (v_1)^{(3)}, (m_1)^{(3)} = (v_2)^{(3)}, \text{ if } (v_1)^{(3)} < (v_2)^{(3)} \]
\[(m_2)^{(3)} = (v_1)^{(3)}, (m_1)^{(3)} = (v_2)^{(3)}, \text{ if } (v_1)^{(3)} > (v_2)^{(3)} \]

Then the solution satisfies the inequalities
\[G_{20}^0 e^{((S_1)^{(3)} - (p_{20})^3) t} \leq G_{20}^0 e^{(S_1)^{(3)} t} \]
\[(p_{21})^3 \text{ is defined} \]

*422

*423

\[
\frac{1}{(m_3)^3} G_{20}^0 e^{((S_1)^{(3)} - (p_{20})^3) t} \leq G_{21}^0 (t) \leq \frac{1}{(m_3)^3} G_{20}^0 e^{(S_1)^{(3)} t} \leq 424
\]
\[
\left(\frac{a_{20}^{(3)}}{(a_{20}^{(3)})^3 (S_1)^{(3)} - (p_{20})^3 (S_2)^{(3)} t)} e^{(S_1)^{(3)} - (p_{20})^3 (S_2)^{(3)} t} - e^{-(a_{20}^{(3)})^3 t} + e^{(a_{20}^{(3)})^3 t} \right) + G_{22}^0 e^{-(S_2)^{(3)} t} \leq 425
\]
\[
\frac{1}{(m_3)^3} G_{20}^0 e^{(R_{16})^{(3)} t} \leq G_{20}^0 e^{(R_{16})^{(3)} t} \leq \frac{1}{(m_3)^3} G_{20}^0 e^{((R_{16})^{(3)} + (R_{20})^{(3)}) t} \leq 426
\]
\[
\left(\frac{b_{22}^{(3)}}{b_{22}^{(3)}} e^{(R_{16})^{(3)} t} - e^{-(b_{22}^{(3)})^3 t} + T_{22}^0 e^{-(b_{22}^{(3)})^3 t} \right) \leq 427
\]
\[
\left(\frac{a_{22}^{(3)}}{a_{22}^{(3)}} e^{(R_{16})^{(3)} t} - e^{-(a_{22}^{(3)})^3 t} + T_{22}^0 e^{-(a_{22}^{(3)})^3 t} \right) \leq 428
\]

**Definition of \((S_1)^{(3)}, (S_2)^{(3)}, (R_1)^{(3)}, (R_2)^{(3)}\):**

Where \((S_1)^{(3)} = (a_{20}^{(3)})^3 (m_2)^3 - (a_{20}^{(3)})^3 \)
\((S_2)^{(3)} = (a_{22}^{(3)})^3 - (p_{22}^{(3)})^3 \)
Behavior of the solutions

If we denote and define

**Definition of** $(\sigma_1)^{(4)}, (\sigma_2)^{(4)}, (\tau_1)^{(4)}, (\tau_2)^{(4)}$:

(d) $(\sigma_1)^{(4)}, (\sigma_2)^{(4)}, (\tau_1)^{(4)}, (\tau_2)^{(4)}$ four constants satisfying

\[-(\sigma_2)^{(4)} \leq -(a_{24})^{(4)} + (a_{25})^{(4)} - (a_{24}^{(4)})(T_{25}, t) + (a_{25}^{(4)})(T_{25}, t) \leq -(\sigma_1)^{(4)}\]

\[-(\tau_2)^{(4)} \leq -(b_{24})^{(4)} + (b_{25})^{(4)} - (b_{24}^{(4)})(G_{27}, t) - (b_{25}^{(4)})(G_{27}, t) \leq -(\tau_1)^{(4)}\]

**Definition of** $(v_1)^{(4)}, (v_2)^{(4)}, (u_1)^{(4)}, (u_2)^{(4)}, (v)^{(4)}, (u)^{(4)}$:

(c) By $(v_1)^{(4)} > 0, (v_2)^{(4)} < 0$ and respectively $(u_1)^{(4)} > 0, (u_2)^{(4)} < 0$ the roots of the equations $(a_{25})^{(4)}(v^{(4)})^2 + (\sigma_1)^{(4)}v^{(4)} - (a_{24})^{(4)} = 0$

and $(b_{25})^{(4)}(u^{(4)})^2 + (\tau_1)^{(4)}u^{(4)} - (b_{24})^{(4)} = 0$ and

**Definition of** $(\bar{v}_1)^{(4)}, (\bar{v}_2)^{(4)}, (\bar{u}_1)^{(4)}, (\bar{u}_2)^{(4)}$:

By $(\bar{v}_1)^{(4)} > 0, (\bar{v}_2)^{(4)} < 0$ and respectively $(\bar{u}_1)^{(4)} > 0, (\bar{u}_2)^{(4)} < 0$ the roots of the equations $(a_{25})^{(4)}(v^{(4)})^2 + (\sigma_1)^{(4)}v^{(4)} - (a_{24})^{(4)} = 0$

and $(b_{25})^{(4)}(u^{(4)})^2 + (\tau_1)^{(4)}u^{(4)} - (b_{24})^{(4)} = 0$

**Definition of** $(m_1)^{(4)}, (m_2)^{(4)}, (\mu_1)^{(4)}, (\mu_2)^{(4)}, (v_0)^{(4)}$:

(f) If we define $(m_1)^{(4)}, (m_2)^{(4)}, (\mu_1)^{(4)}, (\mu_2)^{(4)}$ by

\[(m_2)^{(4)} = (v_0)^{(4)}, (m_1)^{(4)} = (v_1)^{(4)}, \text{ if } (v_0)^{(4)} < (v_1)^{(4)}\]

\[(m_2)^{(4)} = (v_1)^{(4)}, (m_1)^{(4)} = (v_2)^{(4)}, \text{ if } (v_1)^{(4)} < (v_2)^{(4)}\]

\[(m_2)^{(4)} = (v_2)^{(4)}, (m_1)^{(4)} = (v_0)^{(4)}, \text{ if } (v_2)^{(4)} < (v_0)^{(4)}\]

and analogously

\[(\mu_2)^{(4)} = (u_0)^{(4)}, (\mu_1)^{(4)} = (u_1)^{(4)}, \text{ if } (u_0)^{(4)} < (u_1)^{(4)}\]

\[(\mu_2)^{(4)} = (u_1)^{(4)}, (\mu_1)^{(4)} = (u_2)^{(4)}, \text{ if } (u_1)^{(4)} < (u_2)^{(4)}\]

\[(\mu_2)^{(4)} = (u_2)^{(4)}, (\mu_1)^{(4)} = (u_0)^{(4)}, \text{ if } (u_2)^{(4)} < (u_0)^{(4)}\]

are defined by 59 and 64 respectively

Then the solution satisfies the inequalities

\[G_{24}e^{(S_1^{(4)} - (p_{24})^{(4)}t)} \leq G_{24}(t) \leq G_{24}e^{(S_1^{(4)}t)}\]

where $(p_i)^{(4)}$ is defined
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

\[
\frac{1}{(m_1)^4} G^{(4)}_{24} e^{(S_1)^{(4)}} \quad (p_{26})^{(4)} t \leq G_{25}^{(0)} (S_1)^{(4)} t \leq \frac{1}{(m_2)^4} G^{(0)}_{24} e^{(S_1)^{(4)} t}
\]

\[
\frac{(a_{26})^{(4)} e^{(S_1)^{(4)} - (p_{26})^{(4)} t}}{(m_1)^{(4)} (S_1)^{(4)} - (p_{26})^{(4)^4} - (S_1)^{(4)}^{(4)}} \left[ e^{((S_1)^{(4)} - (p_{26})^{(4)} t)} - e^{-(S_1)^{(4)} t} \right] + G_{26}^{(0)} e^{-(S_1)^{(4)} t} \leq G_{26}^{(0)} (t) \leq (a_{26})^{(4)} e^{240(m_2)(31)^4 - (a_{26})^{(4)} e^4(S_1)4t - e^{-(a_{26})^{(4)} 4t} + 6260e - (a_{26})^{(4)} 4t}
\]

\[
T_0^{(4)} e^{(R_1)^{(4)} t} \leq T_{24}^{(0)} \leq T_{24}^{(0)} e^{((R_1)^{(4)^4} + (R_2)^{(4)^4}) t}
\]

\[
\frac{1}{(m_2)^4} T_0^{(4)} e^{(R_1)^{(4)^4} t} \leq T_{24}^{(0)} \leq \frac{1}{(m_2)^4} T_{24}^{(0)} e^{((R_1)^{(4)^4} + (R_2)^{(4)^4}) t}
\]

\[
\frac{(b_{26})^{(4)^2} \tau_{24}}{(m_1)^{(4)^4} (R_1)^{(4)^4} - (b_{26})^{(4)^4}} \left[ e^{(R_1)^{(4)^4} t} - e^{-(b_{26})^{(4)^4} t} \right] + T_{26}^{(0)^4} e^{-(b_{26})^{(4)^4} t} \leq T_{26}^{(0)^4} \leq T_{26}^{(0)^4} e^{-(R_2)^{(4)^4} t} + T_{26}^{(0)^4} e^{-(R_2)^{(4)^4} t}
\]

**Definition of** \((S_1)^{(4)^4}, (S_2)^{(4)^4}, (R_1)^{(4)^4}, (R_2)^{(4)^4}\):-

Where \((S_1)^{(4)^4} = (a_{26})^{(4)^4} (m_2)^{(4)^4} - (a_{26})^{(4)^4}\)

\[
(S_2)^{(4)^4} = (a_{26})^{(4)^4} - (p_{26})^{(4)^4}
\]

\[
(R_1)^{(4)^4} = (b_{26})^{(4)^4} (\mu_2)^{(4)^4} - (b_{26})^{(4)^4}
\]

\[
(R_2)^{(4)^4} = (b_{26})^{(4)^4} - (r_{26})^{(4)^4}
\]

**Behavior of the solutions**

If we denote and define

**Definition of** \((\sigma_1)^{(5)^4}, (\sigma_2)^{(5)^4}, (\tau_1)^{(5)^4}, (\tau_2)^{(5)^4}\):

\[\begin{align*}
-\sigma_1^{(5)^4} & \leq (a_{28})^{(5)^4} + (a_{29})^{(5)^4} - (a_{28})^{(5)^4}(T_{29}, t) + (a_{29})^{(5)^4}(T_{29}, t) \leq -\sigma_1^{(5)^4} \\
-\tau_2^{(5)^4} & \leq -b_{28}^{(5)^4} + (b_{29}^{5)^4} - (b_{28}^{5)^4}((G_{31}^{(t)})) - (b_{29}^{5)^4}((G_{31}^{(t)})) \leq -\tau_2^{(5)^4}
\end{align*}\]

**Definition of** \((v_1)^{(5)^4}, (v_2)^{(5)^4}, (u_1)^{(5)^4}, (u_2)^{(5)^4}, (\nu)^{(5)^4}, u^{(5)^4}\):

\[\begin{align*}
(a_{28})^{(5)^4}(v^{(5)^4})^2 + (\sigma_1)^{(5)^4} v^{(5)^4} - (a_{28})^{(5)^4} = 0 \\
(b_{29})^{(5)^4}(u^{(5)^4})^2 + (\tau_1)^{(5)^4} u^{(5)^4} - (b_{29})^{(5)^4} = 0
\end{align*}\]

**Definition of** \((\tilde{v}_1)^{(5)^4}, (\tilde{v}_2)^{(5)^4}, (\tilde{u}_1)^{(5)^4}, (\tilde{u}_2)^{(5)^4}\):

\[\begin{align*}
(a_{29})^{(5)^4}(\nu^{(5)^4})^2 + (\sigma_2)^{(5)^4} \nu^{(5)^4} - (a_{29})^{(5)^4} = 0 \\
(b_{29})^{(5)^4}(u^{(5)^4})^2 + (\tau_2)^{(5)^4} \nu^{(5)^4} - (b_{29})^{(5)^4} = 0
\end{align*}\]

**Definition of** \((m_1)^{(5)^4}, (m_2)^{(5)^4}, (\mu_1)^{(5)^4}, (\mu_2)^{(5)^4}, (\nu_0)^{(5)^4}\):-

\[\begin{align*}
(m_2)^{(5)^4} = (v_0)^{(5)^4}, (m_1)^{(5)^4} = (v_1)^{(5)^4}, \text{ if } (v_0)^{(5)^4} < (v_1)^{(5)^4} \\
(m_2)^{(5)^4} = (v_1)^{(5)^4}, (m_1)^{(5)^4} = (\tilde{v}_1)^{(5)^4}, \text{ if } (v_1)^{(5)^4} < (v_0)^{(5)^4} < (\tilde{v}_2)^{(5)^4},
\end{align*}\]
Event, Cause, and Quantum Memory Register—An Augmentation-Arrondissement Model

and \( (v_0)^{(s)} = \frac{e_0}{g_0} \)

\( (m_2)^{(s)} = (v_1)^{(s)}, (m_1)^{(s)} = (v_0)^{(s)}, \) \( i f \ (v_1)^{(s)} < (v_0)^{(s)} \)

and analogously

\( (\mu_2)^{(s)} = (u_0)^{(s)}, (\mu_1)^{(s)} = (u_1)^{(s)}, \) \( i f \ (u_0)^{(s)} < (u_1)^{(s)} \)

\( (\mu_2)^{(s)} = (u_1)^{(s)} \) \(\mu_1)^{(s)} = (u_0)^{(s)}, \) \( i f \ (u_1)^{(s)} < (u_0)^{(s)} < (u_0)^{(s)} \)

\( (\mu_2)^{(s)} = (u_1)^{(s)} \) \(\mu_1)^{(s)} = (u_0)^{(s)}, \) \( i f \ (u_1)^{(s)} < (u_0)^{(s)} \)

Then the solution satisfies the inequalities

\[ G_{28}^0 e^{(S_1)^{(s)}-(P_28)^{(s)} s} \leq G_{29}^0 e^{(S_1)^{(s)} t} \leq G_{29}^0 e^{(S_1)^{(s)} t} \]

where \( (p_1)^{(s)} \) is defined

\[ \frac{1}{(m_3)^{(s)}} G_{29}^0 e^{(S_1)^{(s)}-(P_28)^{(s)} s} \leq G_{29}^0 e^{(S_1)^{(s)} t} \leq \frac{1}{(m_2)^{(s)}} G_{29}^0 e^{(S_1)^{(s)} t} \]

\[ \left( \frac{(a_30)^{(s)} g_{20}}{(m_2)^{(s)} (m_1)^{(s)}-(P_28)^{(s)} s)} \right) e^{((S_1)^{(s)}-(P_28)^{(s)} s) t} - e^{-(S_2)^{(s)} t} + G_{20}^0 e^{-(S_2)^{(s)} t} \leq G_{20}^0 e^{(S_3)^{(s)} t} \]

\[ (a)30 e^{280 (m2) (S1) 5 \sim (a30)^{280} e^{(S1)^{280} t} \sim (a30)^{280} e^{(S1)^{280} t} \sim (a30)^{280} e^{(S1)^{280} t} \sim (a30)^{280} e^{(S1)^{280} t} \]

\[ T_{28}^0 e^{(R_1)^{(s)} t} \leq T_{28}^0 e^{((R_1)^{280} t) t} \]

\[ \frac{1}{(m_2)^{(s)}} T_{28}^0 e^{(R_1)^{(s)} t} \leq T_{28}^0 e^{(R_1)^{(s)} t} \leq \frac{1}{(m_2)^{(s)}} T_{28}^0 e^{(R_1)^{(s)} t} \]

\[ \frac{(b_30)^{(s)}}{(m_1)^{(s)} (R_1)^{(s)}-(P_28)^{(s)} s)} e^{(R_1)^{(s)} t} - e^{-(b_30)^{(s)} t} + T_{20}^0 e^{-(b_30)^{(s)} t} \leq T_{20}^0 e^{-(b_30)^{(s)} t} \]

\[ \frac{(b_30)^{(s)} T_{28}^0}{(m_2)^{(s)} (R_1)^{(s)}-(P_28)^{(s)} s)} e^{(R_1)^{(s)} t} - e^{-(R_2)^{(s)} t} + T_{20}^0 e^{-(R_2)^{(s)} t} \]

**Definition of** \( (S_2)^{(s)}, (S_2)^{(s)}, (R_1)^{(s)}, (R_2)^{(s)} \):

Where \( (S_1)^{(s)} = (a_28)^{(s)} (m_2)^{(s)} - (a_28)^{(s)} \)

\( (S_2)^{(s)} = (a_30)^{(s)} - (p_30)^{(s)} \)

\( (R_1)^{(s)} = (b_28)^{(s)} (\mu_2)^{(s)} - (b_28)^{(s)} \)

\( (R_2)^{(s)} = (b_30)^{(s)} - (r_30)^{(s)} \)

**Behavior of the solutions**

If we denote and define

**Definition of** \( (\sigma_1)^{(6)}, (\sigma_2)^{(6)}, (\tau_1)^{(6)}, (\tau_2)^{(6)} \):

\( j \) \( (\sigma_1)^{(6)}, (\sigma_2)^{(6)}, (\tau_1)^{(6)}, (\tau_2)^{(6)} \) four constants satisfying

\[-(\sigma_2)^{(6)} \leq -(a_{32}^{'(6)}) + (a_{33}^{'(6)}) - (a_{32}^{'(6)} (T_{33}, t) + (a_{33}^{'(6)} (T_{33}, t) \leq -(\sigma_1)^{(6)}}

95
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

\[ -\tau_2^{(6)} \leq -(b_{32}^{(6)}) + (b_{33}^{(6)}) - (b_{34}^{(6)}((G_{33})_t) - (b_{32}^{(6)}((G_{33})_t) \leq -\tau_1^{(6)} \]

**Definition of** \((v_2)^{(6)}, (v_3)^{(6)}, (u_2)^{(6)}, (u_3)^{(6)}, v^{(6)}, u^{(6)} : \)

(k) By \((v_1)^{(6)} > 0, (v_2)^{(6)} < 0 \) and respectively \((u_1)^{(6)} > 0, (u_2)^{(6)} < 0 \) the roots of the equations \((a_{33})^{(6)}(v^{(6)})^2 + (\sigma_1)^{(6)}v^{(6)} - (a_{32})^{(6)} = 0 \)
and \((b_{33})^{(6)}(u^{(6)})^2 + (\tau_1)^{(6)}u^{(6)} - (b_{32})^{(6)} = 0 \)

**Definition of** \((\bar{v}_1)^{(6)}, (\bar{v}_2)^{(6)}, (\bar{u}_1)^{(6)}, (\bar{u}_2)^{(6}) : \)

By \((\bar{v}_1)^{(6)} > 0, (\bar{v}_2)^{(6)} < 0 \) and respectively \((\bar{u}_1)^{(6)} > 0, (\bar{u}_2)^{(6)} < 0 \) the roots of the equations \((a_{33})^{(6)}(v^{(6)})^2 + (\sigma_2)^{(6)}v^{(6)} - (a_{32})^{(6)} = 0 \)
and \((b_{33})^{(6)}(u^{(6)})^2 + (\tau_2)^{(6)}u^{(6)} - (b_{32})^{(6)} = 0 \)

**Definition of** \((m_1)^{(6)}, (m_2)^{(6)}, (\mu_1)^{(6)}, (\mu_2)^{(6)}, (\nu_0)^{(6)} : \)

(i) If we define \((m_1)^{(6)}, (m_2)^{(6)}, (\mu_1)^{(6)}, (\mu_2)^{(6)} \) by:

\[
(m_2)^{(6)} = (v_0)^{(6)}, (m_1)^{(6)} = (v_1)^{(6)}, \text{ if } (v_0)^{(6)} < (v_1)^{(6)}
\]

\[
(m_2)^{(6)} = (v_1)^{(6)}, (m_1)^{(6)} = (v_0)^{(6)}, \text{ if } (v_1)^{(6)} < (v_0)^{(6)} < (\bar{v}_1)^{(6)}
\]

\[
(m_2)^{(6)} = (v_1)^{(6)}, (m_1)^{(6)} = (v_0)^{(6)}, \text{ if } (v_1)^{(6)} < (v_0)^{(6)} < (\bar{v}_1)^{(6)}
\]

and analogously

\[
(\mu_2)^{(6)} = (u_0)^{(6)}, (\mu_1)^{(6)} = (u_1)^{(6)}, \text{ if } (u_0)^{(6)} < (u_1)^{(6)}
\]

\[
(\mu_2)^{(6)} = (u_1)^{(6)}, (\mu_1)^{(6)} = (u_0)^{(6)}, \text{ if } (u_1)^{(6)} < (u_0)^{(6)} < (\bar{u}_1)^{(6)}
\]

\[
(\mu_2)^{(6)} = (u_1)^{(6)}, (\mu_1)^{(6)} = (u_0)^{(6)}, \text{ if } (u_1)^{(6)} < (u_0)^{(6)} < (\bar{u}_1)^{(6)}
\]

where \((u_0)^{(6)}, (\bar{u}_0)^{(6)} \) are defined respectively.

Then the solution satisfies the inequalities:

\[
G_{32}^{(6)}e^{((S_1)^{(6)}-(p_{32})^{(6)})t} \leq G_{32}^{(6)}(t) \leq G_{32}^{(6)}e^{((S_1)^{(6)}+p_{32})^{(6)})t}
\]

where \((p_i)^{(6)} \) is defined by:

\[
\frac{1}{(m_1)^{(6)}}G_{32}^{(6)}e^{((S_1)^{(6)}-(p_{32})^{(6)})t} \leq G_{32}^{(6)}(t) \leq \frac{1}{(m_2)^{(6)}}G_{32}^{(6)}e^{((S_1)^{(6)}+p_{32})^{(6)})t}
\]

\[
\left(\frac{a_{32}}{(m_1)^{(6)}}\right)^{\frac{2}{3}}\left(\frac{a_{32}}{(m_2)^{(6)}}\right)^{\frac{2}{3}}\left(e^{((S_1)^{(6)}-(p_{32})^{(6)})t} - e^{((S_1)^{(6)}+(p_{32})^{(6)})t}\right) + G_{34}^{(6)}e^{-(S_2)^{(6)})t} \leq G_{34}(t) \leq (a_{34})666320(m2)^6(31)-(a_{34})6666e(31)6t-e-(a_{34})6t+63406e-(a_{34})6t
\]

\[
T_{32}^{(6)}e^{((R_1)^{(6)}+(R_2)^{(6)})t} \leq T_{32}(t) \leq T_{32}^{(6)}e^{((R_1)^{(6)}-(R_2)^{(6)})t}
\]

\[
\frac{1}{(m_1)^{(6)}}T_{32}^{(6)}e^{((R_1)^{(6)}-(R_2)^{(6)})t} \leq T_{32}(t) \leq \frac{1}{(m_2)^{(6)}}T_{32}^{(6)}e^{((R_1)^{(6)}+(R_2)^{(6)})t}
\]

\[
\left(\frac{b_{32}}{(m_1)^{(6)}}\right)^{\frac{2}{3}}\left(\frac{b_{32}}{(m_2)^{(6)}}\right)^{\frac{2}{3}}\left(e^{((R_1)^{(6)}-(R_2)^{(6)})t} - e^{-(b_{32})^{(6)})t}\right) + T_{34}^{(6)}e^{-(b_{34})^{(6)})t} \leq T_{34}(t) \leq T_{34}^{(6)}e^{((b_{34})^{(6)})t}
\]
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

**Definition of** $(S_1)^{(6)}, (S_2)^{(6)}, (R_1)^{(6)}, (R_2)^{(6)}$:

Where $(S_1)^{(6)} = (a_{32})^{(6)}(m_2)^{(6)} - (a_{32})^{(6)}$

$(S_2)^{(6)} = (a_{34})^{(6)} - (p_{34})^{(6)}$

$(R_1)^{(6)} = (b_{32})^{(6)}(m_2)^{(6)} - (b_{32})^{(6)}$

$(R_2)^{(6)} = (b_{34})^{(6)} - (r_{34})^{(6)}$

**Proof**: From GLOBAL EQUATIONS we obtain

$\frac{ds^{(1)}}{dt} = (a_{13})^{(1)} - ((a_{13})^{(1)} - (a_{14})^{(1)} + (a_{14})^{(1)}(T_{14}, t)) - (a_{14})^{(1)}(T_{14}, t)v^{(1)} - (a_{14})^{(1)}v^{(1)}$

**Definition of** $v^{(1)}$:

$v^{(1)} = \frac{v_{13}}{g_{14}}$

It follows

$-(a_{13})^{(1)}v^{(1)} - (a_{13})^{(1)} \leq \frac{ds^{(1)}}{dt} \leq -(a_{14})^{(1)}v^{(1)} - (a_{13})^{(1)}$

From which one obtains

**Definition of** $(\tilde{v}_{13})^{(1)}, (v_0)^{(1)}$:

$a)\quad \text{For } 0 < \frac{(v_0)^{(1)}}{(v_{13})^{(1)}} = \frac{a_{13}}{a_{14}} < (v_{13})^{(1)} < (\tilde{v}_{13})^{(1)}$

$v^{(1)}(t) \geq \frac{(v_0)^{(1)} + (C)^{(1)}(v_{13})^{(1)}(v_0)^{(1)} + (v_{13})^{(1)}(v_{13})^{(1)} - (v_0)^{(1)}(v_0)^{(1)})}{1 + (C)^{(1)}} - e^{-(a_{14})^{(1)}(v_{13})^{(1)}(v_0)^{(1)}(v_0)^{(1)}]} \leq (\tilde{v}_{13})^{(1)}$

$C^{(1)} = \frac{(v_{13})^{(1)}(v_{13})^{(1)}(v_{13})^{(1)}(v_{13})^{(1)} - (v_0)^{(1)}(v_0)^{(1)}]}{(v_{13})^{(1)}(v_{13})^{(1)}(v_{13})^{(1)}(v_{13})^{(1)} - (v_0)^{(1)}(v_0)^{(1)}}]

In the same manner, we get

$v^{(1)}(t) \leq \frac{(v_0)^{(1)} + (C)^{(1)}(v_{13})^{(1)}(v_0)^{(1)} + (v_{13})^{(1)}(v_{13})^{(1)} - (v_0)^{(1)}(v_0)^{(1)}]}{1 + (C)^{(1)}} - e^{-(a_{14})^{(1)}(v_{13})^{(1)}(v_0)^{(1)}(v_0)^{(1)}]} \leq (\tilde{v}_{13})^{(1)}$

From which we deduce $(v_0)^{(1)} \leq v^{(1)}(t) \leq (\tilde{v}_{13})^{(1)}$

$b)\quad \text{If } 0 < (v_1)^{(1)} < (v_0)^{(1)} = \frac{a_{13}}{a_{14}} < (\tilde{v}_{13})^{(1)} \text{ we find like in the previous case,}$

$(v_1)^{(1)} \leq \frac{(v_0)^{(1)} + (C)^{(1)}(v_{13})^{(1)}(v_0)^{(1)} + (v_{13})^{(1)}(v_{13})^{(1)} - (v_0)^{(1)}(v_0)^{(1)}]}{1 + (C)^{(1)}} - e^{-(a_{14})^{(1)}(v_{13})^{(1)}(v_0)^{(1)}(v_0)^{(1)}]} \leq v^{(1)}(t) \leq (\tilde{v}_{13})^{(1)}$

$c)\quad \text{If } 0 < (v_1)^{(1)} \leq (\tilde{v}_{13})^{(1)} \leq \frac{(v_0)^{(1)}}{(v_{13})^{(1)}} = \frac{a_{13}}{a_{14}} \text{ we obtain}$

$(v_1)^{(1)} \leq v^{(1)}(t) \leq \frac{(v_0)^{(1)} + (C)^{(1)}(v_{13})^{(1)}(v_0)^{(1)} + (v_{13})^{(1)}(v_{13})^{(1)} - (v_0)^{(1)}(v_0)^{(1)}]}{1 + (C)^{(1)}} - e^{-(a_{14})^{(1)}(v_{13})^{(1)}(v_0)^{(1)}(v_0)^{(1)}]} \leq (v_0)^{(1)}$

And so with the notation of the first part of condition (c), we have

**Definition of** $v^{(1)}(t)$:

$(m_2)^{(1)} \leq v^{(1)}(t) \leq (m_1)^{(1)}$, \quad $v^{(1)}(t) = \frac{a_{13}}{a_{14}}$

In a completely analogous way, we obtain

**Definition of** $u^{(1)}(t)$:

$(\mu_2)^{(1)} \leq u^{(1)}(t) \leq (\mu_1)^{(1)}$, \quad $u^{(1)}(t) = \frac{r_{13}}{r_{14}}$

Now, using this result and replacing it in GLOBAL EQUATIONS we get easily the result stated in the theorem.

**Particular case**:

If $(a_{13})^{(1)} = (a_{14})^{(1)}$ then $(\sigma_1)^{(1)} = (\sigma_2)^{(1)}$ and in this case $(v_1)^{(1)} = (\tilde{v}_{13})^{(1)}$ if in addition $(v_0)^{(1)} =
we obtain
\[ \frac{dv}{dt} = (a_{16}')(2) - \left( (a_{17}')^2(2) + (a_{17}')^2(T_{17}, t) \right) - (a_{17}')^2(T_{17}, t)v(2) - (a_{17})^2v(2) \]

**Definition of \( v(2) \):**
\[ v(2) = \frac{\bar{G}_{16}}{\bar{G}_{17}} \]

Then it follows
\[ -\left( (a_{17})^2v(2)^2 + \sigma_2)^2v(2) - (a_{16})^2 \right) \leq \frac{dv}{dt} \leq -\left( (a_{17})^2v(2)^2 + \sigma_2)^2v(2) - (a_{16})^2 \right) \]

From which one obtains
**Definition of \( \bar{v}(2) \), \( v(0) \):**

(d) For \( 0 < (v(0))(2) = \frac{G_{16}}{G_{17}} < (v(2))(2) < (\bar{v}(2)) \)

\[ v(2)(t) \leq \frac{(v(2))(2) + (\bar{v}(2))(2)}{1 + (\bar{v}(2))(2)^2} \leq v(2)(t) \leq \frac{(v(2))(2) + (\bar{v}(2))(2)}{1 + (\bar{v}(2))(2)^2} \]

From which we deduce \( (v(0))(2) \leq v(2)(t) \leq (\bar{v}(2)) \)

(e) If \( 0 < (v(2))(2) < (v(2))(2) = \frac{G_{16}}{G_{17}} < (\bar{v}(2))(2) \) we find like in the previous case,

\[ (v(2))(2) \leq \frac{(v(2))(2) + (\bar{v}(2))(2)}{1 + (\bar{v}(2))(2)^2} \leq \frac{(v(2))(2) + (\bar{v}(2))(2)}{1 + (\bar{v}(2))(2)^2} \]

(f) If \( 0 < (v(2))(2) < (v(2))(2) = \frac{G_{16}}{G_{17}} \), we obtain

\[ (v(2))(2) \leq v(2)(t) \leq \frac{(v(2))(2) + (\bar{v}(2))(2)}{1 + (\bar{v}(2))(2)^2} \leq (v(0))(2) \]

And so with the notation of the first part of condition (c), we have

**Definition of \( v(2)(t) \):**
\[ \frac{\partial v}{\partial t} = \frac{G_{16}}{G_{17}}(t) \]

In a completely analogous way, we obtain

**Definition of \( u(2)(t) \):**
\[ \frac{\partial u}{\partial t} = \frac{G_{16}}{G_{17}}(t) \]

**Particular case:**
If \( (a_{16})^2(2) = (a_{17})^2(2) \), then \( (\sigma_2)^2(2) = (\sigma_2)^2(2) \) and in this case \( (v(2))(2) = (\bar{v}(2))(2) \) if \( 0 < (v(0))(2) = (v(2))(2) \) then \( v(2)(t) = (v(0))(2) \) and as a consequence \( G_{16}(t) = (v(0))(2)G_{17}(t) \)

Analogously if \( (b_{16})^2(2) = (b_{17})^2(2) \), then \( (\tau_2)^2(2) = (\tau_2)^2(2) \) and then \( (u(2))(2) = (\bar{u}(2))(2) \) if \( 0 < (u(0))(2) = (u(2))(2) \) then \( T_{16}(t) = (u(0))(2)T_{17}(t) \) This is an important consequence of the relation between \( v(2)(2) \) and \( (\bar{v}(2)(2) \)

From GLOBAL EQUATIONS we obtain
\[ \frac{dv}{dt} = (a_{20})^3 - \left( (a_{20})^3 - (a_{21})^3 + (a_{20})^3(T_{21}, t) \right) - (a_{21})^3(T_{23}, t)v(3) - (a_{21})^3v(3) \]

**Definition of \( v(3) \):**
\[ v(3) = \frac{G_{20}}{G_{21}} \]

It follows
From which one obtains
\[(a) \quad \text{For} \quad 0 < (v_0)^{(3)} = \frac{d\theta}{d_t} < (v_1)^{(3)} < (\bar{v}_1)^{(3)}\]
\[
\begin{align*}
(v_1)^{(3)} & \leq \frac{(v_1)^{(3)} + (C)^{(3)}(v_2)^{(3)} + (\alpha_2)^{(3)}(v_1)^{(3)} - (v_2)^{(3)})}{1 + (C)^{(3)}e^{-[\alpha_2]^{(3)}(v_1)^{(3)} - (v_2)^{(3})]} \leq \frac{(v_3)^{(3)}(t)}{\bar{v}_1}, \\
(C)^{(3)} & = \frac{(v_1)^{(3)} - (v_2)^{(3)}}{(v_3)^{(3)} - (v_2)^{(3)}}
\end{align*}
\]

it follows \((v_0)^{(3)} \leq (v_3)^{(3)}(t) \leq (v_1)^{(3)}\)

In the same manner, we get
\[
\begin{align*}
(v_1)^{(3)} & \leq \frac{(v_1)^{(3)} + (C)^{(3)}(v_2)^{(3)} + (\alpha_2)^{(3)}(v_1)^{(3)} - (v_2)^{(3)})}{1 + (C)^{(3)}e^{-[\alpha_2]^{(3)}(v_1)^{(3)} - (v_2)^{(3})]} \leq \frac{(v_3)^{(3)}(t)}{\bar{v}_1}, \\
(C)^{(3)} & = \frac{(v_1)^{(3)} - (v_2)^{(3)}}{(v_3)^{(3)} - (v_2)^{(3)}}
\end{align*}
\]

\textbf{Definition of} \((\bar{v}_2)^{(3)}\) :-

From which we deduce \((v_0)^{(3)} \leq (v_3)^{(3)}(t) \leq (\bar{v}_1)^{(3)}\)

\[(b) \quad \text{If} \quad 0 < (v_1)^{(3)} < (v_0)^{(3)} = \frac{d\theta}{d_t} < (\bar{v}_2)^{(3)} \quad \text{we find like in the previous case,}\]
\[
\begin{align*}
(v_1)^{(3)} & \leq \frac{(v_1)^{(3)} + (C)^{(3)}(v_2)^{(3)} + (\alpha_2)^{(3)}(v_1)^{(3)} - (v_2)^{(3)})}{1 + (C)^{(3)}e^{-[\alpha_2]^{(3)}(v_1)^{(3)} - (v_2)^{(3})]} \leq \frac{(v_3)^{(3)}(t)}{(v_1)^{(3)}}, \\
(C)^{(3)} & = \frac{(v_1)^{(3)} - (v_2)^{(3)}}{(v_3)^{(3)} - (v_2)^{(3)}}
\end{align*}
\]

\[(c) \quad \text{If} \quad 0 < (v_1)^{(3)} \leq (\bar{v}_2)^{(3)} \leq (v_0)^{(3)} = \frac{d\theta}{d_t}, \quad \text{we obtain}\]
\[
\begin{align*}
(v_1)^{(3)} & \leq (v_3)^{(3)}(t) \leq \frac{(v_1)^{(3)} + (C)^{(3)}(v_2)^{(3)} + (\alpha_2)^{(3)}(v_1)^{(3)} - (v_2)^{(3)})}{1 + (C)^{(3)}e^{-[\alpha_2]^{(3)}(v_1)^{(3)} - (v_2)^{(3})]} \leq (v_0)^{(3)}
\end{align*}
\]

And so with the notation of the first part of condition \(c\), we have

\textbf{Definition of} \((v_3)^{(3)}(t)\) :-

\[
(m_2)^{(3)} \leq (v_3)^{(3)}(t) \leq (m_1)^{(3)}, \quad (v_3)^{(3)}(t) = \frac{d\theta}{d_t}
\]

In a completely analogous way, we obtain

\textbf{Definition of} \((u_3)^{(3)}(t)\) :-

\[
(\mu_3)^{(3)} \leq (u_3)^{(3)}(t) \leq (\mu_1)^{(3)}, \quad (u_3)^{(3)}(t) = \frac{d\theta}{d_t}
\]

Now, using this result and replacing it in \textsc{GLOBAL EQUATIONS} we get easily the result stated in the theorem.

\textbf{Particular case :}

If \((a_1)^{(3)} = (a_2)^{(3)}\), then \((\sigma_1)^{(3)} = (\sigma_2)^{(3)}\) and in this case \((v_1)^{(3)} = (\bar{v}_1)^{(3)}\) if in addition \((v_0)^{(3)} = (v_1)^{(3)}\) then \((v_3)^{(3)}(t) = (v_0)^{(3)}\) and as a consequence \((a_2)^{(3)} = (\bar{a}_2)^{(3)}\)

Analogously if \((b_1)^{(3)} = (b_2)^{(3)}\), then \((\tau_1)^{(3)} = (\bar{\tau}_2)^{(3)}\) and then \((u_1)^{(3)} = (\bar{u}_2)^{(3)}\) if in addition \((u_0)^{(3)} = (u_1)^{(3)}\) then \((a_2)^{(3)} = (a_3)^{(3)}\). This is an important consequence of the relation between \((v_1)^{(3)}\) and \((\bar{v}_1)^{(3)}\)

\[\text{From} \quad \text{GLOBAL EQUATIONS} \quad \text{we obtain}\]
\[
\frac{dv_3^{(4)}}{dt} = (a_2)^{(4)} - (a_2^{(4)} + (a_2^{(4)} + (a_2^{(4)}(T_{25}, t)) - (a_2^{(4)}(T_{25}, t)v_4^{(4)} - (a_2)^{(4)}v_4^{(4)}
\]

\textbf{Definition of} \((v_4)^{(4)}\) :-

\[
(v_4)^{(4)} = \frac{d\theta}{d_t}
\]

It follows
\[
-(a_2)^{(3)}v_4^{(4)} + (a_2)^{(4)}v_4^{(4)} - (a_2)^{(4)} \leq \frac{dv_4^{(4)}}{dt} \leq -(a_2)^{(4)}v_4^{(4)} + (a_4)^{(4)}v_4^{(4)} - (a_2)^{(4)}
\]

From which one obtains

\textbf{Definition of} \((\bar{v}_2)^{(4)}, (v_0)^{(4)}\) :-
For $0 < \frac{(v_{0})^{(4)}}{(v_{1})^{(4)}} < \frac{(\bar{v}_{1})^{(4)}}{(v_{1})^{(4)}}$

\[\nu^{(4)}(t) \geq \frac{(v_{1})^{(4)} - (v_{0})^{(4)}}{4 + (C)^{(4)}(v_{1})^{(4)} - (v_{0})^{(4)}} \times (C)^{(4)} = \frac{(v_{1})^{(4)} - (v_{0})^{(4)}}{(v_{0})^{(4)} - (v_{1})^{(4)}}\]

it follows $(v_{0})^{(4)} \leq \nu^{(4)}(t) \leq (v_{1})^{(4)}$

In the same manner, we get

\[\nu^{(4)}(t) \leq \frac{(\bar{v}_{1})^{(4)} - (v_{0})^{(4)}}{4 + (\bar{C})^{(4)}(v_{1})^{(4)} - (v_{0})^{(4)}} \times (\bar{C})^{(4)} = \frac{(v_{1})^{(4)} - (v_{0})^{(4)}}{(v_{0})^{(4)} - (v_{1})^{(4)}}\]

From which we deduce $(v_{0})^{(4)} \leq \nu^{(4)}(t) \leq (v_{1})^{(4)}$

If $0 < (v_{1})^{(4)} < (v_{0})^{(4)} = \frac{g_{24}}{2g_{25}} < (\bar{v}_{1})^{(4)}$ we find like in the previous case,

\[(v_{1})^{(4)} \leq \frac{(v_{2})^{(4)} - (v_{0})^{(4)}}{1 + (C)^{(4)}(v_{2})^{(4)} - (v_{0})^{(4)}} \leq \nu^{(4)}(t) \leq \frac{(v_{2})^{(4)} - (v_{0})^{(4)}}{1 + (C)^{(4)}(v_{2})^{(4)} - (v_{0})^{(4)}}\]

If $0 < (v_{1})^{(4)} \leq (\bar{v}_{1})^{(4)} \leq \frac{g_{24}}{2g_{25}}$, we obtain

\[(v_{1})^{(4)} \leq \nu^{(4)}(t) \leq \frac{(v_{0})^{(4)}}{1 + (C)^{(4)}(v_{2})^{(4)} - (v_{0})^{(4)}} \leq (v_{0})^{(4)}\]

And so with the notation of the first part of condition (c), we have

**Definition of $\nu^{(4)}(t)$**:\n
\[(m_{2})^{(4)} \leq \nu^{(4)}(t) \leq (m_{1})^{(4)}, \quad \nu^{(4)}(t) = \frac{g_{24}(t)}{g_{25}(t)}\]

In a completely analogous way, we obtain

**Definition of $u^{(4)}(t)$**:\n
\[(m_{2})^{(4)} \leq u^{(4)}(t) \leq (m_{1})^{(4)}, \quad u^{(4)}(t) = \frac{T_{24}(t)}{T_{25}(t)}\]

Now, using this result and replacing it in GLOBAL EQUATIONS we get easily the result stated in the theorem.

**Particular case**:\n
If $(a_{24}^{(4)} = a_{25}^{(4)})$, then $(v_{1})^{(4)} = (v_{2})^{(4)}$ and in this case $(v_{1})^{(4)} = (\bar{v}_{1})^{(4)}$ if in addition $(v_{0})^{(4)} = (v_{1})^{(4)}$ then $v^{(4)}(t) = (v_{0})^{(4)}$ and as a consequence $G_{24}(t) = (v_{0})^{(4)}G_{25}(t)$ this also defines $(v_{0})^{(4)}$ for the special case.

Analogously if $(b_{24}^{(4)} = b_{25}^{(4)})$, then $(\tau_{1})^{(4)} = (\tau_{2})^{(4)}$ and then $(u_{2})^{(4)} = (u_{2})^{(4)}$ if in addition $(u_{0})^{(4)} = (u_{2})^{(4)}$ then $T_{24}(t) = (u_{0})^{(4)}T_{25}(t)$ This is an important consequence of the relation between $(v_{1})^{(4)}$ and $(\bar{v}_{1})^{(4)}$, and definition of $(u_{0})^{(4)}$.

From GLOBAL EQUATIONS we obtain

\[
\frac{dv^{(5)}}{dt} = (a_{28}^{(5)}) - \left( (a_{28}^{(5)} - (a_{29}^{(5)}) + (a_{28}^{(5)})(T_{29}, t) \right) - (a_{28}^{(5)})(T_{29}, t)v^{(5)} - (a_{29}^{(5)}v^{(5)}
\]
Definition of \( \nu^{(5)}(\cdot) \):

\[
\nu^{(5)}(t) = \frac{\nu_2^{(5)}}{\nu_1^{(5)}}. 
\]

It follows

\[
- \left( (a_{28})^{(5)}(\nu^{(5)})^2 + (\sigma_2)^{(5)}(\nu^{(5)}) - (a_{29})^{(5)} \right) \leq \frac{d\nu^{(5)}}{dt} \leq - \left( (a_{28})^{(5)}(\nu^{(5)})^2 + (\sigma_1)^{(5)}(\nu^{(5)}) - (a_{29})^{(5)} \right).
\]

From which one obtains

**Definition of** \((\nu_{1}^{(5)}), (\nu_0^{(5)})\):

\[(g) \quad \text{For } 0 < \frac{(\nu_0^{(5)})^2}{(\nu_1^{(5)})^2} < (\nu_1^{(5)}) < (\nu_{1}^{(5)}) \]

\[
\nu^{(5)}(t) \geq \frac{(\nu_1^{(5)})^2 + (\nu_1^{(5)})^2}{5 + (\nu_1^{(5)})^2 + (\nu_1^{(5)})^2} \leq (C)^{(5)} = \frac{(\nu_1^{(5)})^2 - (\nu_0^{(5)})}{(\nu_0^{(5)})^2 - (\nu_1^{(5)})}
\]

it follows \((\nu_0^{(5)}) \leq \nu^{(5)}(t) \leq (\nu_1^{(5)})\)

In the same manner, we get

\[
\nu^{(5)}(t) \leq \frac{(\nu_1^{(5)})^2 + (\nu_1^{(5)})^2}{5 + (\nu_1^{(5)})^2 + (\nu_1^{(5)})^2} \leq (\nu_{1}^{(5)}) \]

From which we deduce \((\nu_0^{(5)}) \leq \nu^{(5)}(t) \leq (\nu_{1}^{(5)})\)

\[(h) \quad \text{If } 0 < (\nu_1^{(5)}) < (\nu_0^{(5)}) = \frac{\nu_2^{(5)}}{\nu_1^{(5)}} < (\nu_{1}^{(5)}) \text{ we find like in the previous case,} \]

\[
(\nu_1^{(5)}) \leq \frac{(\nu_1^{(5)})^2 + (\nu_1^{(5)})^2}{5 + (\nu_1^{(5)})^2 + (\nu_1^{(5)})^2} \leq (\nu_{1}^{(5)}) \leq (\nu_1^{(5)})^2 + (\nu_1^{(5)})^2 \leq (\nu_{1}^{(5)})
\]

\[(i) \quad \text{If } 0 < (\nu_1^{(5)}) \leq (\nu_1^{(5)}) \leq \frac{(\nu_0^{(5)})^2}{(\nu_1^{(5)})^2} \text{, we obtain} \]

\[
(\nu_1^{(5)}) \leq \nu^{(5)}(t) \leq \frac{(\nu_1^{(5)})^2 + (\nu_1^{(5)})^2}{5 + (\nu_1^{(5)})^2 + (\nu_1^{(5)})^2} \leq (\nu_0^{(5)})
\]

And so with the notation of the first part of condition (c), we have

**Definition of** \(\nu^{(5)}(\cdot)\):

\[
(m_1^{(5)}) \leq \nu^{(5)}(t) \leq (m_1^{(5)}), \quad \nu^{(5)}(t) = \frac{\nu_2^{(5)}(t)}{\nu_1^{(5)}(t)}
\]

In a completely analogous way, we obtain

**Definition of** \(u^{(5)}(\cdot)\):

\[
(\mu_2^{(5)}) \leq u^{(5)}(t) \leq (\mu_1^{(5)}), \quad u^{(5)}(t) = \frac{\nu_2^{(5)}(t)}{\nu_1^{(5)}(t)}
\]

Now, using this result and replacing it in GLOBAL EQUATIONS we get easily the result stated in the theorem.

**Particular case:**

If \((a_{28})^{(5)} = (a_{29})^{(5)}, \text{then} (\sigma_1)^{(5)} = (\sigma_2)^{(5)} \text{ and in this case} (\nu_1^{(5)}) = (\nu_{1}^{(5)}) \text{ if in addition} (\nu_0^{(5)}) =
we obtain
\[ \frac{d\nu^{(6)}}{dt} = (a_{32}^{(6)}) - (a_{33}^{(6)}) + (a_{32}^{(6)}(T_{33}, t) - (a_{33}^{(6)}(T_{33}, t)\nu^{(6)} - (a_{33}^{(6)}\nu^{(6)}) \]

**Definition of \( \nu^{(6)} \):**
\[ \nu^{(6)} = \frac{\theta e_{2}}{\theta_{3}} \]

It follows
\[ -\left( (a_{33}^{(6)}\nu^{(6)})^{2} + (\sigma_{2}^{(6)}\nu^{(6)} - (a_{32}^{(6)}\right) \leq \frac{d\nu^{(6)}}{dt} \leq -\left( (a_{33}^{(6)}\nu^{(6)})^{2} + (\sigma_{1}^{(6)}\nu^{(6)} - (a_{32}^{(6)}) \]

From which one obtains

**Definition of \( \bar{\nu}^{(6)}, (\nu_{0})^{(6)} \):**

(j) For \( 0 < \frac{(\nu_{0})^{(6)}}{\theta_{0}^{(6)}} < (\nu_{1})^{(6)} < (\bar{\nu})^{(6)} \)
\[ \nu^{(6)}(t) \leq \frac{(\nu_{2})^{(6)}(\bar{\nu})^{(6)}}{1 + (C)^{(6)}}e^{-\left( (a_{33}^{(6)}(\nu_{1})^{(6)} - (\nu_{2})^{(6)}) \right] \leq (C)^{(6)} = \frac{(\nu_{1})^{(6)} - (\nu_{0})^{(6)}}{(\nu_{0})^{(6)} - (\nu_{2})^{(6)}} \]

From which we deduce \( (\nu_{0})^{(6)} \leq \nu^{(6)}(t) \leq (\bar{\nu})^{(6)} \)

(k) If \( 0 < (\nu_{1})^{(6)} < (\nu_{0})^{(6)} = \frac{\theta e_{2}}{\theta_{3}} < (\bar{\nu})^{(6)} \) we find like in the previous case,
\[ (\nu_{1})^{(6)} \leq \frac{(\nu_{2})^{(6)}(\nu_{3})^{(6)}}{1 + (C)^{(6)}}e^{-\left( (a_{33}^{(6)}(\nu_{1})^{(6)} - (\nu_{2})^{(6)}) \right] \leq \nu^{(6)}(t) \leq \frac{(\nu_{2})^{(6)}(\bar{\nu})^{(6)}}{1 + (C)^{(6)}}e^{-\left( (a_{33}^{(6)}(\nu_{1})^{(6)} - (\nu_{2})^{(6)}) \right] \leq (\bar{\nu})^{(6)} \]

(l) If \( 0 < (\nu_{1})^{(6)} < (\nu_{0})^{(6)} = \frac{\theta e_{2}}{\theta_{3}} \) we obtain
\[ (\nu_{1})^{(6)} \leq \nu^{(6)}(t) \leq \frac{(\nu_{2})^{(6)}(\bar{\nu})^{(6)}}{1 + (C)^{(6)}}e^{-\left( (a_{33}^{(6)}(\nu_{1})^{(6)} - (\nu_{2})^{(6)}) \right] \leq (\nu_{0})^{(6)} \]

And so with the notation of the first part of condition (c), we have

**Definition of \( \nu^{(6)}(t) \):**
\[ (m_{2})^{(6)} \leq \nu^{(6)}(t) \leq (m_{1})^{(6)}, \quad \nu^{(6)}(t) = \frac{\theta_{2}(t)}{\theta_{3}(t)} \]

In a completely analogous way, we obtain
Definition of $u^{(6)}(t) :$

\[ (\mu_2)^{(6)} \leq u^{(6)}(t) \leq (\mu_1)^{(6)}, \quad u^{(6)}(t) = \frac{T_{32}(t)}{T_{33}(t)} \]

Now, using this result and replacing it in GLOBAL EQUATIONS we get easily the result stated in the theorem.

**Particular case:**

If $(a''_3)^{(6)} = (a''_3)^{(6)},$ then $(\sigma_1)^{(6)} = (\sigma_2)^{(6)}$ and in this case $(v_1)^{(6)} = (v_1)^{(6)}$ if in addition $(v_0)^{(6)} = (v_0)^{(6)}$ then $\nu^{(6)}(t) = (v_0)^{(6)}$ and as a consequence $G_{32}(t) = (v_0)^{(6)}G_{33}(t)$ this also defines $(v_0)^{(6)}$ for the special case.

Analogously if $(b''_3)^{(6)} = (b''_3)^{(6)},$ then $(\tau_1)^{(6)} = (\tau_2)^{(6)}$ and then $(u_1)^{(6)} = (u_1)^{(6)}$ if in addition $(u_0)^{(6)} = (u_1)^{(6)}$ then $T_{32}(t) = (u_0)^{(6)}T_{33}(t)$ This is an important consequence of the relation between $(v_1)^{(6)}$ and $(v_1)^{(6)},$ and definition of $(u_0)^{(6)}.$

We can prove the following

**Theorem 3:** If $(a''_0)^{(1)}$ and $(b''_0)^{(1)}$ are independent on $t,$ and the conditions

\[
(\alpha_{13})^{(1)}(a_{14})^{(1)} - (a_{13})^{(1)}(a_{14})^{(1)} < 0,
\]

\[
(\alpha_{13})^{(1)}(a_{14})^{(1)} - (a_{13})^{(1)}(a_{14})^{(1)} + (a_{14})^{(1)}(p_{13})^{(1)} + (a_{14})^{(1)}(p_{14})^{(1)} + (p_{13})^{(1)}(p_{14})^{(1)} > 0,
\]

\[
(b'_{13})^{(1)}(b'_{14})^{(1)} - (b'_{13})^{(1)}(b'_{14})^{(1)} - (b'_{13})^{(1)}(b'_{14})^{(1)} - (b'_{13})^{(1)}(r_{14})^{(1)} + (b'_{13})^{(1)}(r_{14})^{(1)} + (r_{13})^{(1)}(r_{14})^{(1)} < 0,
\]

with $(p_{13})^{(1)},(r_{14})^{(1)}$ as defined, then the system

\[
(a''_0)^{(2)} and (b''_0)^{(2)} are independent on $t,$ and the conditions
\]

\[
(\alpha_{16})^{(2)}(a_{27})^{(2)} - (a_{16})^{(2)}(a_{27})^{(2)} < 0,
\]

\[
(\alpha_{16})^{(2)}(a_{27})^{(2)} + (a_{16})^{(2)}(a_{27})^{(2)}(p_{16})^{(2)}(p_{17})^{(2)} + (p_{16})^{(2)}(p_{17})^{(2)} > 0,
\]

\[
(b'_{16})^{(2)}(b'_{17})^{(2)} - (b'_{16})^{(2)}(b'_{17})^{(2)} > 0,
\]

\[
(b'_{16})^{(2)}(b'_{17})^{(2)} - (b'_{16})^{(2)}(b'_{17})^{(2)} - (b'_{16})^{(2)}(r_{17})^{(2)} + (b'_{16})^{(2)}(r_{17})^{(2)} + (r_{16})^{(2)}(r_{17})^{(2)} < 0,
\]

with $(p_{16})^{(2)},(r_{17})^{(2)}$ as defined are satisfied, then the system

If $(a''_0)^{(3)}$ and $(b''_0)^{(3)}$ are independent on $t,$ and the conditions

\[
(\alpha_{20})^{(3)}(a_{21})^{(3)} - (a_{20})^{(3)}(a_{21})^{(3)} < 0,
\]

\[
(\alpha_{20})^{(3)}(a_{21})^{(3)} + (a_{20})^{(3)}(p_{20})^{(3)} + (a_{21})^{(3)}(p_{21})^{(3)} + (p_{20})^{(3)}(p_{21})^{(3)} > 0,
\]

\[
(b'_{20})^{(3)}(b'_{21})^{(3)} - (b'_{20})^{(3)}(b'_{21})^{(3)} > 0,
\]

\[
(b'_{20})^{(3)}(b'_{21})^{(3)} - (b'_{20})^{(3)}(b'_{21})^{(3)} - (b'_{20})^{(3)}(r_{21})^{(3)} + (b'_{20})^{(3)}(r_{21})^{(3)} + (r_{20})^{(3)}(r_{21})^{(3)} < 0,
\]

with $(p_{20})^{(3)},(r_{21})^{(3)}$ as defined are satisfied, then the system

If $(a''_0)^{(4)}$ and $(b''_0)^{(4)}$ are independent on $t,$ and the conditions

\[
(\alpha_{24})^{(4)}(a_{25})^{(4)} - (a_{24})^{(4)}(a_{25})^{(4)} < 0,
\]

\[
(\alpha_{24})^{(4)}(a_{25})^{(4)} + (a_{24})^{(4)}(p_{24})^{(4)} + (a_{25})^{(4)}(p_{25})^{(4)} + (p_{24})^{(4)}(p_{25})^{(4)} > 0,
\]

\[
(b'_{24})^{(4)}(b'_{25})^{(4)} - (b'_{24})^{(4)}(b'_{25})^{(4)} > 0,
\]

\[
(b'_{24})^{(4)}(b'_{25})^{(4)} - (b'_{24})^{(4)}(b'_{25})^{(4)} - (b'_{24})^{(4)}(r_{25})^{(4)} + (b'_{24})^{(4)}(r_{25})^{(4)} + (r_{24})^{(4)}(r_{25})^{(4)} < 0,
\]

with $(p_{24})^{(4)},(r_{25})^{(4)}$ as defined are satisfied, then the system

If $(a''_0)^{(5)}$ and $(b''_0)^{(5)}$ are independent on $t,$ and the conditions

\[
(\alpha_{28})^{(5)}(a_{29})^{(5)} - (a_{28})^{(5)}(a_{29})^{(5)} < 0,
\]

\[
(\alpha_{28})^{(5)}(a_{29})^{(5)} + (a_{28})^{(5)}(p_{28})^{(5)} + (a_{29})^{(5)}(p_{29})^{(5)} + (p_{28})^{(5)}(p_{29})^{(5)} > 0,
\]

\[
(b'_{28})^{(5)}(b'_{29})^{(5)} - (b'_{28})^{(5)}(b'_{29})^{(5)} > 0,
\]

\[
(b'_{28})^{(5)}(b'_{29})^{(5)} - (b'_{28})^{(5)}(b'_{29})^{(5)} - (b'_{28})^{(5)}(r_{29})^{(5)} + (b'_{28})^{(5)}(r_{29})^{(5)} + (r_{28})^{(5)}(r_{29})^{(5)} < 0,
\]

with $(p_{28})^{(5)},(r_{29})^{(5)}$ as defined are satisfied, then the system

If $(a''_0)^{(6)}$ and $(b''_0)^{(6)}$ are independent on $t,$ and the conditions

\[
(\alpha_{32})^{(6)}(a_{33})^{(6)} - (a_{32})^{(6)}(a_{33})^{(6)} < 0,
\]

\[
(\alpha_{32})^{(6)}(a_{33})^{(6)} + (a_{32})^{(6)}(p_{32})^{(6)} + (a_{33})^{(6)}(p_{33})^{(6)} + (p_{32})^{(6)}(p_{33})^{(6)} > 0,
\]

\[
(b'_{32})^{(6)}(b'_{33})^{(6)} - (b'_{32})^{(6)}(b'_{33})^{(6)} > 0,
\]

\[
(b'_{32})^{(6)}(b'_{33})^{(6)} - (b'_{32})^{(6)}(b'_{33})^{(6)} - (b'_{33})^{(6)}(r_{33})^{(6)} + (b'_{33})^{(6)}(r_{33})^{(6)} + (r_{32})^{(6)}(r_{33})^{(6)} < 0,
\]

with $(p_{32})^{(6)},(r_{33})^{(6)}$ as defined are satisfied, then the system

\[
(a_{13})^{(1)}G_{14} - [(a'_{13})^{(1)} + (a'_{13})^{(1)}(T_{14})]G_{13} = 0
\]
has a unique positive solution, which is an equilibrium solution for the system

\[
(a_{16})^{(2)} G_{16} - [(a_{16})^{(2)} + (a_{16}^{''})^{(2)}] G_{16} = 0
\]

\[
(a_{17})^{(2)} G_{17} - [(a_{17})^{(2)} + (a_{17}^{''})^{(2)}] G_{17} = 0
\]

\[
(a_{18})^{(2)} G_{18} - [(a_{18})^{(2)} + (a_{18}^{''})^{(2)}] G_{18} = 0
\]

\[
(b_{16})^{(2)} G_{16} - [(b_{16})^{(2)} - (b_{16}^{''})^{(2)}] G_{16} = 0
\]

\[
(b_{17})^{(2)} G_{17} - [(b_{17})^{(2)} - (b_{17}^{''})^{(2)}] G_{17} = 0
\]

\[
(b_{18})^{(2)} G_{18} - [(b_{18})^{(2)} - (b_{18}^{''})^{(2)}] G_{18} = 0
\]

has a unique positive solution, which is an equilibrium solution for

\[
(a_{20})^{(3)} G_{20} - [(a_{20})^{(3)} + (a_{20}^{''})^{(3)}] G_{20} = 0
\]

\[
(a_{21})^{(3)} G_{21} - [(a_{21})^{(3)} + (a_{21}^{''})^{(3)}] G_{21} = 0
\]

\[
(a_{22})^{(3)} G_{22} - [(a_{22})^{(3)} + (a_{22}^{''})^{(3)}] G_{22} = 0
\]

\[
(b_{20})^{(3)} G_{20} - [(b_{20})^{(3)} - (b_{20}^{''})^{(3)}] G_{20} = 0
\]

\[
(b_{21})^{(3)} G_{21} - [(b_{21})^{(3)} - (b_{21}^{''})^{(3)}] G_{21} = 0
\]

\[
(b_{22})^{(3)} G_{22} - [(b_{22})^{(3)} - (b_{22}^{''})^{(3)}] G_{22} = 0
\]

has a unique positive solution, which is an equilibrium solution for

\[
(a_{24})^{(6)} G_{24} - [(a_{24})^{(6)} + (a_{24}^{''})^{(6)}] G_{24} = 0
\]

\[
(a_{25})^{(6)} G_{25} - [(a_{25})^{(6)} + (a_{25}^{''})^{(6)}] G_{25} = 0
\]

\[
(b_{24})^{(6)} G_{24} - [(b_{24})^{(6)} - (b_{24}^{''})^{(6)}] G_{24} = 0
\]

\[
(b_{25})^{(6)} G_{25} - [(b_{25})^{(6)} - (b_{25}^{''})^{(6)}] G_{25} = 0
\]

\[
(b_{26})^{(6)} G_{26} - [(b_{26})^{(6)} - (b_{26}^{''})^{(6)}] G_{26} = 0
\]

has a unique positive solution, which is an equilibrium solution for the system

\[
(a_{28})^{(5)} G_{28} - [(a_{28})^{(5)} + (a_{28}^{''})^{(5)}] G_{28} = 0
\]

\[
(a_{29})^{(5)} G_{29} - [(a_{29})^{(5)} + (a_{29}^{''})^{(5)}] G_{29} = 0
\]

\[
(a_{30})^{(5)} G_{30} - [(a_{30})^{(5)} + (a_{30}^{''})^{(5)}] G_{30} = 0
\]

\[
(b_{28})^{(5)} G_{28} - [(b_{28})^{(5)} - (b_{28}^{''})^{(5)}] G_{28} = 0
\]

\[
(b_{29})^{(5)} G_{29} - [(b_{29})^{(5)} - (b_{29}^{''})^{(5)}] G_{29} = 0
\]

\[
(b_{30})^{(5)} G_{30} - [(b_{30})^{(5)} - (b_{30}^{''})^{(5)}] G_{30} = 0
\]

has a unique positive solution, which is an equilibrium solution for the system

\[
(a_{32})^{(6)} G_{32} - [(a_{32})^{(6)} + (a_{32}^{''})^{(6)}] G_{32} = 0
\]

\[
(a_{33})^{(6)} G_{33} - [(a_{33})^{(6)} + (a_{33}^{''})^{(6)}] G_{33} = 0
\]
(a) Indeed the first two equations have a nontrivial solution \( G_{13}, G_{14} \) if
\[
F(T) = (a'_{13})(a'_{14}) - (a_{13})(a_{14}) + (a_{13})(a_{14})T_{14} + (a_{14})(a'_{13})T_{14} = 0
\]
\[
F(T_{19}) = (a'_{16})(a'_{17}) - (a_{16})(a_{17}) + (a_{16})(a_{17})T_{17} + (a_{17})(a'_{16})T_{17} = 0
\]
\[
F(T_{23}) = (a'_{20})(a'_{21}) - (a_{20})(a_{21}) + (a_{20})(a_{21})T_{21} + (a_{21})(a'_{20})T_{21} = 0
\]
\[
F(T_{25}) = (a'_{24})(a'_{25}) - (a_{24})(a_{25}) + (a_{24})(a_{25})T_{25} + (a_{25})(a'_{24})T_{25} = 0
\]

**Definition and uniqueness of** \( T_{14} \):

After hypothesis \( f(0) < 0, f(\infty) > 0 \) and the functions \( (a'_{13})(a'_{14}) \) being increasing, it follows that there exists a unique \( T_{14} \) for which \( f(T_{14}) = 0 \). With this value, we obtain from the three first equations
\[
G_{13} = \frac{(a_{13})(a_{14}) + (a_{13})(a_{14})(T_{14})}{(a_{13})(a_{14})(a_{14})(T_{14})}
\]
\[
G_{15} = \frac{(a_{13})(a_{14})(a_{14})(T_{14})}{(a_{13})(a_{14})(a_{14})(T_{14})}
\]

**Definition and uniqueness of** \( T_{17} \):

After hypothesis \( f(0) < 0, f(\infty) > 0 \) and the functions \( (a'_{16})(a'_{17}) \) being increasing, it follows that there exists a unique \( T_{17} \) for which \( f(T_{17}) = 0 \). With this value, we obtain from the three first equations
\[
G_{16} = \frac{(a_{16})(a_{17}) + (a_{16})(a_{17})(T_{17})}{(a_{16})(a_{17})(a_{17})(T_{17})}
\]
\[
G_{18} = \frac{(a_{16})(a_{17})(a_{17})(T_{17})}{(a_{16})(a_{17})(a_{17})(T_{17})}
\]

**Definition and uniqueness of** \( T_{21} \):

After hypothesis \( f(0) < 0, f(\infty) > 0 \) and the functions \( (a'_{20})(a'_{21}) \) being increasing, it follows that there exists a unique \( T_{21} \) for which \( f(T_{21}) = 0 \). With this value, we obtain from the three first equations
\[
G_{20} = \frac{(a_{20})(a_{21}) + (a_{20})(a_{21})(T_{21})}{(a_{20})(a_{21})(a_{21})(T_{21})}
\]
\[
G_{22} = \frac{(a_{20})(a_{21})(a_{21})(T_{21})}{(a_{20})(a_{21})(a_{21})(T_{21})}
\]

**Definition and uniqueness of** \( T_{25} \):

After hypothesis \( f(0) < 0, f(\infty) > 0 \) and the functions \( (a'_{24})(a'_{25}) \) being increasing, it follows that there exists a unique \( T_{25} \) for which \( f(T_{25}) = 0 \). With this value, we obtain from the three first equations
\[
G_{24} = \frac{(a_{24})(a_{25}) + (a_{24})(a_{25})(T_{25})}{(a_{24})(a_{25})(a_{25})(T_{25})}
\]
\[
G_{26} = \frac{(a_{24})(a_{25})(a_{25})(T_{25})}{(a_{24})(a_{25})(a_{25})(T_{25})}
\]
Event, Cause, and Quantum Memory Register-An Augmentation-Arrondissement Model

Definition and uniqueness of $T_{13}$:

After hypothesis $f(0) < 0, f(\infty) > 0$ and the functions $(a_i(0))^{(6)}(T_{33})$ being increasing, it follows that there exists a unique $T_{13}$ for which $f(T_{13}) = 0$. With this value, we obtain from the three first equations

\[ G_{28} = \frac{(a_{28}(5))_{G_{28}}}{(a_{28}(5) + a_{29}(5))(T_{29})}, \quad G_{30} = \frac{(a_{30}(5))_{G_{30}}}{(a_{30}(5) + a_{39}(5))(T_{29})} \]

By the same argument, the equations 92,93 admit solutions $G_{13}, G_{14}$ if

\[ \varphi(G) = (b_{13}(1))^{(1)}(b_{14}(1)) - (b_{13}(1))^{(1)}(b_{14}(1)) - \left[ (b_{13}(1))^{(1)}(b_{14}(1))^{(1)}(G) + (b_{13}(1))^{(1)}(b_{14}(1))^{(1)}(G) + (b_{13}(1))^{(1)}(b_{14}(1))^{(1)}(G) = 0 \right. \]

Where in $G(G_{13}, G_{14})$, $G_{13}, G_{14}$ must be replaced by their values from 96. It is easy to see that $\varphi$ is a decreasing function in $G_{14}$ taking into account the hypothesis $\varphi(0) > 0, \varphi(\infty) < 0$ it follows that there exists a unique $G_{14}$ such that $\varphi(G_{14}) = 0$

By the same argument, the equations 92,93 admit solutions $G_{16}, G_{17}$ if

\[ \varphi(G_{16}) = (b_{16}(2))^{(2)}(b_{17}(2)) - (b_{16}(2))^{(2)}(b_{17}(2)) - \left[ (b_{16}(2))^{(2)}(b_{17}(2))^{(2)}((G_{19}) + (b_{16}(2))^{(2)}(b_{17}(2))^{(2)}(G_{19}) ) = 0 \right. \]

Where in $G_{19}$ must be replaced by their values from 96. It is easy to see that $\varphi$ is a decreasing function in $G_{17}$ taking into account the hypothesis $\varphi(0) > 0, \varphi(\infty) < 0$ it follows that there exists a unique $G_{17}$ such that $\varphi(G_{17}) = 0$

By the same argument, the concatenated equations admit solutions $G_{20}, G_{21}$ if

\[ \varphi(G_{20}, G_{21}) = (b_{20}(3))^{(3)}(b_{21}(3)) - (b_{20}(3))^{(3)}(b_{21}(3)) - \left[ (b_{20}(3))^{(3)}(b_{21}(3))^{(3)}((G_{23}) + (b_{20}(3))^{(3)}(b_{21}(3))^{(3)}(G_{23}) ) = 0 \right. \]

Where in $G_{23}, G_{20}, G_{21}$, $G_{22}, G_{24}, G_{25}$ must be replaced by their values from 96. It is easy to see that $\varphi$ is a decreasing function in $G_{21}$ taking into account the hypothesis $\varphi(0) > 0, \varphi(\infty) < 0$ it follows that there exists a unique $G_{21}$ such that $\varphi(G_{21}) = 0$

By the same argument, the equations of modules admit solutions $G_{24}, G_{25}$ if

\[ \varphi(G_{24}) = (b_{24}(4))^{(4)}(b_{25}(4)) - (b_{24}(4))^{(4)}(b_{25}(4)) - \left[ (b_{24}(4))^{(4)}(b_{25}(4))^{(4)}((G_{27}) + (b_{24}(4))^{(4)}(b_{25}(4))^{(4)}(G_{27}) ) = 0 \right. \]

Where in $G_{27}, G_{24}, G_{25}$, $G_{26}, G_{29}$ must be replaced by their values from 96. It is easy to see that $\varphi$ is a decreasing function in $G_{25}$ taking into account the hypothesis $\varphi(0) > 0, \varphi(\infty) < 0$ it follows that there exists a unique $G_{25}$ such that $\varphi(G_{25}) = 0$

By the same argument, the equations (modules) admit solutions $G_{28}, G_{29}$ if

\[ \varphi(G_{28}, G_{29}) = (b_{28}(5))^{(5)}(b_{29}(5)) - (b_{28}(5))^{(5)}(b_{29}(5)) - \left[ (b_{28}(5))^{(5)}(b_{29}(5))^{(5)}((G_{31}) + (b_{28}(5))^{(5)}(b_{29}(5))^{(5)}(G_{31}) ) = 0 \right. \]

Where in $G_{31}, G_{28}, G_{29}$, $G_{30}, G_{26}$ must be replaced by their values from 96. It is easy to see that $\varphi$ is a decreasing function in $G_{29}$ taking into account the hypothesis $\varphi(0) > 0, \varphi(\infty) < 0$ it follows that there exists a unique $G_{29}$ such that $\varphi(G_{29}) = 0$

By the same argument, the equations (modules) admit solutions $G_{32}, G_{33}$ if

\[ \varphi(G_{32}) = (b_{32}(6))^{(6)}(b_{33}(6)) - (b_{32}(6))^{(6)}(b_{33}(6)) - \left[ (b_{32}(6))^{(6)}(b_{33}(6))^{(6)}((G_{35}) + (b_{32}(6))^{(6)}(b_{33}(6))^{(6)}(G_{35}) ) = 0 \right. \]

Where in $G_{35}, G_{32}, G_{33}$, $G_{34}, G_{32}, G_{34}$ must be replaced by their values. It is easy to see that $\varphi$ is a decreasing function in $G_{33}$ taking into account the hypothesis $\varphi(0) > 0, \varphi(\infty) < 0$ it follows that there exists a unique $G_{33}$ such that $\varphi(G_{33}) = 0$

Finally we obtain the unique solution of 89 to 94

$G_{14}$ given by $\varphi(G_{14}) = 0, T_{14}$ given by $f(T_{14}) = 0$ and

\[ G_{13} = \frac{(a_{13}(5))^{(5)}G_{13}}{(a_{13}(5) + a_{14}(5))(T_{14})}, \quad G_{15} = \frac{(a_{15}(5))^{(5)}G_{15}}{(a_{15}(5) + a_{14}(5))(T_{14})} \]

\[ T_{13} = \frac{(a_{13}(1))^{(1)}G_{13}}{(a_{13}(1) + a_{14}(1))(T_{14})}, \quad T_{15} = \frac{(a_{15}(1))^{(1)}G_{15}}{(a_{15}(1) + a_{14}(1))(T_{14})} \]

Obviously, these values represent an equilibrium solution

Finally we obtain the unique solution

$G_{17}$ given by $\varphi(G_{17}) = 0, T_{17}$ given by $f(T_{17}) = 0$ and

\[ G_{16} = \frac{(a_{16}(2))^{(2)}G_{16}}{(a_{16}(2) + a_{17}(2))(T_{17})}, \quad G_{18} = \frac{(a_{18}(2))^{(2)}G_{18}}{(a_{18}(2) + a_{17}(2))(T_{17})} \]

106
Obviously, these values represent an equilibrium solution.

Finally we obtain the unique solution

\[
\begin{align*}
G_{21} & = 0, 
T_{21} & = 0 \\
G_{22} & = 0, 
T_{22} & = 0 \\
G_{24} & = 0, 
T_{24} & = 0 \\
G_{26} & = 0, 
T_{26} & = 0 \\

\end{align*}
\]

Obviously, these values represent an equilibrium solution.

Finally we obtain the unique solution

\[
\begin{align*}
G_{29} & = 0, 
T_{29} & = 0 \\
G_{30} & = 0, 
T_{30} & = 0 \\
G_{32} & = 0, 
T_{32} & = 0 \\
G_{34} & = 0, 
T_{34} & = 0 \\

\end{align*}
\]

Obviously, these values represent an equilibrium solution.

If the conditions of the previous theorem are satisfied and if the functions \((a_1''(1))\) and \((b_1''(1))\) Belong to \(C^1(\mathbb{R}_+),\) then the above equilibrium point is asymptotically stable.

**Proof:** Denote

\[
\begin{align*}
\text{Definition of } G_i, T_i &: \quad G_i = G_{i1} + G_{i2} \\
T_i &= T_{i1} + T_{i2} \\
\frac{\partial (a_{14}''(1))}{\partial G_{i1}} (T_{14}) &= (q_{14})^{(1)} \\
\frac{\partial (b_{14}''(1))}{\partial G_{i2}} (G^{(i)}) &= s_{ij}
\end{align*}
\]

Then taking into account equations (global) and neglecting the terms of power 2, we obtain

\[
\begin{align*}
\frac{dG_{13}}{dt} &= -(a_{13}^{(1)}) + (p_{13}^{(1)}) G_{13} + (a_{13}^{(1)}) G_{14} - (q_{13}^{(1)}) G_{13} T_{14} \\
\frac{dG_{14}}{dt} &= -(a_{14}^{(1)}) + (p_{14}^{(1)}) G_{14} + (a_{14}^{(1)}) G_{13} - (q_{14}^{(1)}) G_{14} T_{14} \\
\frac{dG_{15}}{dt} &= -(a_{15}^{(1)}) + (p_{15}^{(1)}) G_{15} + (a_{15}^{(1)}) G_{14} - (q_{15}^{(1)}) G_{15} T_{14} \\
\frac{dG_{16}}{dt} &= -(b_{13}^{(1)}) + (r_{13}^{(1)}) T_{13} + (b_{13}^{(1)}) T_{14} + \sum_{1\leq j\leq 13} (s_{13}(j)) T_{13} G_{13} \\
\frac{dG_{17}}{dt} &= -(b_{14}^{(1)}) + (r_{14}^{(1)}) T_{14} + (b_{14}^{(1)}) T_{13} + \sum_{1\leq j\leq 13} (s_{14}(j)) T_{14} G_{14} \\
\frac{dG_{18}}{dt} &= -(b_{15}^{(1)}) + (r_{15}^{(1)}) T_{15} + (b_{15}^{(1)}) T_{14} + \sum_{1\leq j\leq 13} (s_{15}(j)) T_{15} G_{15} \\

\end{align*}
\]

If the conditions of the previous theorem are satisfied and if the functions \((a_1''(2))\) and \((b_1''(2))\) Belong to \(C^2(\mathbb{R}_+),\) then the above equilibrium point is asymptotically stable.

**Denote**

\[
\begin{align*}
\text{Definition of } G_i, T_i &: \quad G_i = G_{i1} + G_{i2} \\
T_i &= T_{i1} + T_{i2} \\
\frac{\partial (a_{17}''(2))}{\partial T_{17}} (T_{17}) &= (q_{17})^{(2)} \\
\frac{\partial (b_{17}''(2))}{\partial G_{19}} (G_{19})^{(i)} &= s_{ij}
\end{align*}
\]

Taking into account equations (global) and neglecting the terms of power 2, we obtain

\[
\begin{align*}
\frac{dG_{16}}{dt} &= -(a_{16}^{(2)}) + (p_{16}^{(2)}) G_{16} + (a_{16}^{(2)}) G_{17} - (q_{16}^{(2)}) G_{16} T_{17} \\
\frac{dG_{17}}{dt} &= -(a_{17}^{(2)}) + (p_{17}^{(2)}) G_{17} + (a_{17}^{(2)}) G_{16} - (q_{17}^{(2)}) G_{17} T_{17} \\
\frac{dG_{18}}{dt} &= -(a_{18}^{(2)}) + (p_{18}^{(2)}) G_{18} + (a_{18}^{(2)}) G_{17} - (q_{18}^{(2)}) G_{18} T_{17}
\end{align*}
\]
If the conditions of the previous theorem are satisfied and if the functions \( a_i^{(3)} \) and \( b_j^{(3)} \) Belong to \( C(\mathbb{R}_+^5) \) then the above equilibrium point is asymptotically stable.

Denote

**Definition of** \( \mathcal{G}_i, T_i \):

\[
G_i = G_i^T + \mathcal{G}_i, \quad T_i = T_i^* + T_i
\]

\[
\frac{\partial G_i^{(3)}}{\partial T_i}(T_2^*) = (q_{23})^3, \quad \frac{\partial G_i^{(3)}}{\partial G_i}(G_{27}^*) = s_{ij}
\]

Then taking into account equations (global) and neglecting the terms of power 2, we obtain

\[
dT_{20} = -(a_2^{(3)}) + (p_2^{(3)})G_20 + (a_2^{(3)})G_{21} - (q_2^{(3)})G_{20}T_{21}
\]

\[
dT_{21} = -(a_2^{(3)}) + (p_2^{(3)})G_20 + (a_2^{(3)})G_{21} - (q_2^{(3)})G_{20}T_{21}
\]

\[
dT_{22} = -(a_2^{(3)}) + (p_2^{(3)})G_20 + (a_2^{(3)})G_{21} - (q_2^{(3)})G_{20}T_{21}
\]

\[
dT_{23} = -(a_2^{(3)}) + (p_2^{(3)})G_20 + (a_2^{(3)})G_{21} - (q_2^{(3)})G_{20}T_{21}
\]

If the conditions of the previous theorem are satisfied and if the functions \( a_i^{(4)} \) and \( b_j^{(4)} \) Belong to \( C(\mathbb{R}_+^6) \) then the above equilibrium point is asymptotically stable.

Denote

**Definition of** \( \mathcal{G}_i, T_i \):

\[
G_i = G_i^T + \mathcal{G}_i, \quad T_i = T_i^* + T_i
\]

\[
\frac{\partial G_i^{(4)}}{\partial T_i}(T_2^*) = (q_{23})^4, \quad \frac{\partial G_i^{(4)}}{\partial G_i}(G_{27}^*) = s_{ij}
\]

Then taking into account equations (global) and neglecting the terms of power 2, we obtain

\[
dT_{24} = -(a_2^{(4)}) + (p_2^{(4)})G_24 + (a_2^{(4)})G_{25} - (q_2^{(4)})G_{24}T_{25}
\]

\[
dT_{25} = -(a_2^{(4)}) + (p_2^{(4)})G_24 + (a_2^{(4)})G_{25} - (q_2^{(4)})G_{24}T_{25}
\]

\[
dT_{26} = -(a_2^{(4)}) + (p_2^{(4)})G_24 + (a_2^{(4)})G_{25} - (q_2^{(4)})G_{24}T_{25}
\]

\[
dT_{27} = -(a_2^{(4)}) + (p_2^{(4)})G_24 + (a_2^{(4)})G_{25} - (q_2^{(4)})G_{24}T_{25}
\]

If the conditions of the previous theorem are satisfied and if the functions \( a_i^{(5)} \) and \( b_j^{(5)} \) Belong to \( C(\mathbb{R}_+^7) \) then the above equilibrium point is asymptotically stable.

Denote

**Definition of** \( \mathcal{G}_i, T_i \):

\[
G_i = G_i^T + \mathcal{G}_i, \quad T_i = T_i^* + T_i
\]

\[
\frac{\partial G_i^{(5)}}{\partial T_i}(T_2^*) = (q_{23})^5, \quad \frac{\partial G_i^{(5)}}{\partial G_i}(G_{27}^*) = s_{ij}
\]

Then taking into account equations (global) and neglecting the terms of power 2, we obtain

\[
dT_{28} = -(a_2^{(5)}) + (p_2^{(5)})G_28 + (a_2^{(5)})G_{29} - (q_2^{(5)})G_{28}T_{29}
\]

\[
dT_{29} = -(a_2^{(5)}) + (p_2^{(5)})G_28 + (a_2^{(5)})G_{29} - (q_2^{(5)})G_{28}T_{29}
\]

\[
dT_{30} = -(a_2^{(5)}) + (p_2^{(5)})G_28 + (a_2^{(5)})G_{29} - (q_2^{(5)})G_{28}T_{29}
\]

\[
dT_{31} = -(a_2^{(5)}) + (p_2^{(5)})G_28 + (a_2^{(5)})G_{29} - (q_2^{(5)})G_{28}T_{29}
\]

If the conditions of the previous theorem are satisfied and if the functions \( a_i^{(6)} \) and \( b_j^{(6)} \) Belong to \( C(\mathbb{R}_+^8) \) then the above equilibrium point is asymptotically stable.

Denote

**Definition of** \( \mathcal{G}_i, T_i \):

\[
G_i = G_i^T + \mathcal{G}_i, \quad T_i = T_i^* + T_i
\]

\[
\frac{\partial G_i^{(6)}}{\partial T_i}(T_2^*) = (q_{23})^6, \quad \frac{\partial G_i^{(6)}}{\partial G_i}(G_{27}^*) = s_{ij}
\]
Definition of $\mathbb{G}_i$,$\mathbb{T}_i$:

\[ G_i = G_i^0, T_i = T_i^0 + T_i^1 \]

\[ \frac{\partial (a_{i3}^{(6)})}{\partial G_{33}} (T_{33}^0) = (q_{33}^{(6)})^0, \quad \frac{\partial (b_{i3}^{(6)})}{\partial G_{33}} (G_{33}^0) = s_{ij} \]

Then taking into account equations(2) and neglecting the terms of power 2, we obtain

\[ \frac{dG_{32}}{dt} = -((a_{i3}^{(6)})^0 + (p_{i3}^{(6)})^0)G_{32} + (a_{i3}^{(6)})G_{33} - (q_{33}^{(6)})G_{32}^* T_{33} \]

\[ \frac{dG_{33}}{dt} = -((a_{i3}^{(6)})^0 + (p_{i3}^{(6)})^0)G_{33} + (a_{i3}^{(6)})G_{33}^* - (q_{33}^{(6)})G_{33}^* T_{33} \]

\[ \frac{dG_{32}}{dt} = -(b_{i3}^{(6)})^0 - (r_{i3}^{(6)})^0 T_{32} + (b_{i3}^{(6)}) T_{33} + \sum_{j=2}^{34} (s_{32}^{(6)}) T_{32} \]

\[ \frac{dG_{34}}{dt} = -(b_{i3}^{(6)})^0 - (r_{i3}^{(6)})^0 T_{34} + (b_{i3}^{(6)}) T_{33} + \sum_{j=2}^{34} (s_{34}^{(6)}) T_{34} \]

The characteristic equation of this system is

\[ \left((\lambda)^{(1)} + ((a_{i1}^{(1)}) + (p_{i1}^{(1)}))((\lambda)^{(1)} + (a_{i3}^{(1)}) G_{13} + (a_{i1}^{(1)}) G_{11}^* G_{13}) \right) \]

\[ + \left((\lambda)^{(1)} + (a_{i3}^{(1)}) + (p_{i3}^{(1)}) (q_{i4}^{(1)}) G_{14} + (a_{i4}^{(1)}) (q_{i3}^{(1)}) G_{13}^* \right) \]

\[ + \left((\lambda)^{(1)} + (b_{i3}^{(1)}) + (r_{i3}^{(1)}) s_{i3}^{(1)} T_{i3} + (b_{i4}^{(1)}) s_{i3}^{(1)} T_{i4} \right) = 0 \]

\[ + (\lambda)^{(2)} + (b_{i1}^{(2)}) - (r_{i3}^{(2)} - (r_{i3}^{(2)})^0 \right) \]

\[ + (\lambda)^{(2)} + (a_{i1}^{(2)}) + (p_{i6}^{(2)}) (q_{i7}^{(2)}) (G_{17} + (a_{i7}^{(2)}) (q_{i6}^{(2)}) G_{16}^* \right) \]

\[ + (\lambda)^{(2)} + (b_{i6}^{(2)}) - (r_{i6}^{(2)}) s_{i6}^{(1)} T_{i6} + (b_{i7}^{(2)}) s_{i6}^{(1)} T_{i7} \]

\[ + (\lambda)^{(2)} + (b_{i6}^{(2)}) - (r_{i6}^{(2)}) s_{i6}^{(1)} T_{i7} + (b_{i7}^{(2)}) s_{i6}^{(1)} T_{i7} \]

\[ + (\lambda)^{(2)} + (a_{i7}^{(2)}) + (p_{i6}^{(2)}) + (p_{i7}^{(2)}) (q_{i18}^{(2)}) G_{19} \]

\[ + (\lambda)^{(2)} + (a_{i1}^{(2)}) + (p_{i6}^{(2)}) (q_{i18}^{(2)}) G_{19} + (a_{i7}^{(2)}) (q_{i18}^{(2)}) G_{19}^* \]

\[ + (\lambda)^{(2)} + (b_{i6}^{(2)}) - (r_{i6}^{(2)}) s_{i6}^{(1)} T_{i7} + (b_{i7}^{(2)}) s_{i6}^{(1)} T_{i7} \]

\[ + (\lambda)^{(3)} + (b_{i2}^{(3)}) - (r_{i2}^{(3)}) (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20}^* \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (b_{i2}^{(3)}) - (r_{i2}^{(3)}) (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (b_{i2}^{(3)}) - (r_{i2}^{(3)}) (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (b_{i2}^{(3)}) - (r_{i2}^{(3)}) (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]

\[ + (\lambda)^{(3)} + (a_{i2}^{(3)}) + (p_{i2}^{(3)}) (q_{i21}^{(3)}) G_{21} + (a_{i2}^{(3)}) (q_{i20}^{(3)}) G_{20} \]
And as one sees, all the coefficients are positive. It follows that all the roots have negative real part, and this proves the theorem.
Acknowledgments:
The introduction is a collection of information from various articles, Books, News Paper reports, Home Pages Of authors, Journal Reviews, Nature ’s Letters, Article Abstracts, Research papers, Abstracts Of Research Papers, Stanford Encyclopedia, Web Pages, Ask a Physicist Column, Deliberations with Professors, the internet including Wikipidea. We acknowledge all authors who have contributed to the same. In the eventuality of the fact that there has been any act of omission on the part of the authors, we regret with great deal of compunction, contrition, regret, trepidation and remorse. As Newton said, it is only because erudite and eminent people allowed one to piggy ride on their backs; probably an attempt has been made to look slightly further. Once again, it is stated that the references are only illustrative and not comprehensive.

References

3. A HAIMOVICI: “On the growth of a two species ecological system divided on age groups”. Tensor, Vol (1982), Commemoration volume dedicated to Professor Akitsugu Kawaguchi on his 80th birthday
13. Note that the relativistic mass, in contrast to the rest mass $m_0$, is not a relativistic invariant, and that the velocity is not a Minkowski four-vector, in contrast to the quantity, where is the differential of the proper time. However, the energy-momentum four-vector is a genuine Minkowski four-vector, and the intrinsic origin of the square-root in the definition of the relativistic mass is the distinction between $dt$ and $d\tau$
21. a b c Conversions used: 1956 International (Steam) Table (IT) values where one calorie ≈ 4.1868 J and one BTU = 1055.05585262 J. Weapons designers' conversion value of one gram TNT = 1000 calories used.
22. Assuming the dam is generating at its peak capacity of 6,809 MW.
23. Assuming a 90/10 alloy of Pt/Ir by weight, a Cp of 25.9 for Pt and 25.1 for Ir, a Pt-dominated average Cp of 25.8, 5.134 moles of metal, and 132 J.K-1 for the prototype. A variation of ±1.5 picograms is of course, much smaller than the actual uncertainty in the mass of the international prototype, which are ±2 micrograms.
25. a b Earth's gravitational self-energy is 4.6 × 10-10 that of Earth's total mass, or 2.7 trillion metric tons. Citation: The Apache Point Observatory Lunar Laser-Ranging Operation (APOLLO), T. W. Murphy, Jr. et al. University of Washington, Dept. of Physics (132 kB PDF, here.).
26. There is usually more than one possible way to define a field energy, because any field can be made to couple to gravity in many different ways. By general scaling arguments, the correct answer at everyday distances, which are long compared to the quantum gravity scale, should be minimal coupling, which means that no powers of the curvature tensor appear. Any non-minimal couplings, along with other higher order terms, are presumably only determined by a theory of quantum gravity, and within string theory, they only start to contribute to experiments at the string scale.
33. See e.g. Lev B.Okun,The concept of Mass, Physics Today 42 (6), June 1969, p. 31–42.
35. Eriksen, Erik; Vøyenli, Kjell (1976), "The classical and relativistic concepts of mass",Foundations of Physics (Springer) 6: 115–124, Bibcode 1976FoPh...6...115E, DOI:10.1007/BF00708670
48. UIBK.ac.at


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