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Research Article

A NEW JUSTIFICATION OF CRITERIA OF NECESSARY AND SUFFICIENT CONDITIONS FOR MAINTAINING STABILITY OF JUPITER'S ROTATIONAL MOTION AROUND THE SUN

Mahammad A.Nurmammadov[1] and Adalet Atai[2]

[1]Department of Theoretical Astrophysics and Cosmology of the Shamakhy Astrophysical Observatory, Azerbaijan National Academy of Sciences, city Shamakha, Azerbaijan
[2]Department of Planets and Small Celestial Bodies of the Shamakhy Astrophysical Observatory, Azerbaijan National Academy of Sciences, city Shamakha, Azerbaijan

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ABSTRACT

In this paper we consider the justification of the criterion, necessary and sufficient conditions for maintaining the stability of the rotational motion of Jupiter with GRS around the Sun. For this purpose, we have to investigate the possible energy balances, which are the sources of both internal and external energy, heat formation, energy budget and energy generation of Jupiter According to the known series of facts creates intuitive questions that the long or eternal stability of the rotational motion of Jupiter around the Sun will be? What are the conditions and criteria for their fulfillment? Such a question has not yet been considered by anyone and this work is being investigated for the first time. With the help of rigorous, mathematically sound treatises to assume the stability of Jupiter's rotational motion around the Sun is proven. For this purpose, it is based on new works by the authors who have recently considered the influence of cyclones, anticyclones, and circulation and rotation factors on the stable dynamics of Jupiter's GRS, new mathematical tractates on the dynamics of the GRS on Jupiter. Based on these results, as well as previously known methods of hydrodynamics and non-classical approaches in the form of lemma, theorems are substantiated that cyclones, anticyclones, circulation and rotational motion of GRS create conditions to apply vortex motion along the closed fluid contour of GRS. Moreover, the mathematical tractates on the steady-state dynamics of GRS make it possible to use the circulation and rotational momentum theory based on the equations of hydrodynamics, the Coriolis force, through the momentum statistics, the lemma and theorems on the circulation acceleration, the vortex line conservation theorem which describes the full rotational motion dynamics of Jupiter are formulated. The very clearvoyance of the internal and external energy of Jupiter allowed proving the justification of the criterion, necessary and sufficient conditions for the conservation of stability of the rotation Jupiter.

INTRODUCTION

In this paper we consider the justification of the criterion, necessary and sufficient conditions for maintaining the stability of the rotational motion of Jupiter with GRS around the Sun. For this purpose, we have to investigate the possible energy balances, which are the sources of both internal and external energy. In this sense, solving the problems of gravity and gravitational wave is a relevant and important task, because it is related to the foundations of elementary particles of the Universe, whose possible energy balances control the rotational motions of Jupiter and other planets around the Sun, as well as neutron stars. Its study provides a better understanding of the complex problems of natural science for all types of objects of the material world. Thus, for Einstein the solar eclipse of 1919 was a stellar hour, and for the wave theory of gravity such a triumph could be the registration of the cone of shock gravity waves from the moving planet Venus during its passage through the Earth's orbit and the stations located on it. Gravitational waves from mergers of black holes and explosions of neutron stars are registered, moreover, for the planet these factors are the main substantiation of the proof of conservation of stability of rotational motions of Jupiter with GRS around the Sun. New approaches of the proof of the model of conservation of stability of rotational motions of Jupiter with GRS around the Sun on a rigorous scientific basis are substantiated by really existing laws of physics and lead to the establishment of previously unknown and previously objectively existing laws, properties and phenomena of the material world. These works bring fundamental changes in the

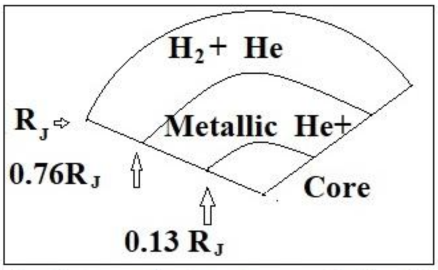
Corresponding author:* **Mahammad A.Nurmammadov
Department of Theoretical Astrophysics and Cosmology of the Shamakhy Astrophysical Observatory, Azerbaijan National Academy of Sciences, city Shamakha, Azerbaijan

level of scientific knowledge, which have all signs of scientific discovery (e.g.,[1]-[4]). and also in this sense we can note the role of works as new interpretations about the dynamics of Jupiter ([5], [6], and therein). Therefore, we will start with the study of the heat release, gravity contracts, atmospheric characteristics, magnetic fields, Io, Europa, Ganymede, energy generating functions. Recall that Jupiter revolves around the Sun at an average distance (half axis) of 778,299,000 km (5.2 AU), starts with740,550,000 km (4.95 AU),perihelion and 816,040,000 km(5.455 AU) at aphelion. Thus we can say that the rotation of Jupiter is the sharpest of all the planets in the solar system and the Jupiterian year lasts 10,475.8 Jupiterian solar days (one revolution around its axis it makes just under ten hours (9 hours, 55 minutes and 30 seconds). Jupiter consists mainly of gaseous and liquid matter, which is divided between a gaseous outer atmosphere and a denser inner atmosphere. The upper atmosphere consists of 88-92% hydrogen and 8-12% helium by volume of gas molecules and about 75% hydrogen and 24% helium by mass, with the remaining one percent made up of other elements. Jupiter has an average radius of 69,911 ± 6 km (43441 miles) and a mass of 1.8986 × 1027 kg.,. In short, Jupiter is nearly 11 times larger than Earth and just under 318 times more massive. However, Earth's density is much higher, as it is an earthly planet - 5.514 g/cm3 compared to 1.326 g/cm³.

This known series of facts from the works [3],[4][5],[6] [7], [8], [9]. [10]create intuitive questions about the long or perpetual stability of Jupiter's rotational motion around the Sun, the conditions and criteria for their fulfillment. Is it possible, with the help of rigorous, mathematically sound treatises, to assume the stability of Jupiter's rotational motion around the Sun?

Heat formation, energy budget and energy generation of Jupiter

Jupiter and Saturn are principally composed of hydrogen. At low temperatures and pressure, H is an insulator in the form of the strongly bound diatomic molecule H At depths of a few thousand kilometers below the upper cloud deck pressure becomes so high that the H_2 becomes dissociated and undergoes a phase transition from the gaseous to a liquid state. For P > 3 million atmospheres, atoms are ionized into freely moving protons and electrons. Phase is known as liquid metallic hydrogen (LMH). LMH is highly conducting (the electrons are highly mobile) and this results in the generation of a strong magnetic field (see figure1).



The internal structure of Jupiter

Figure 1

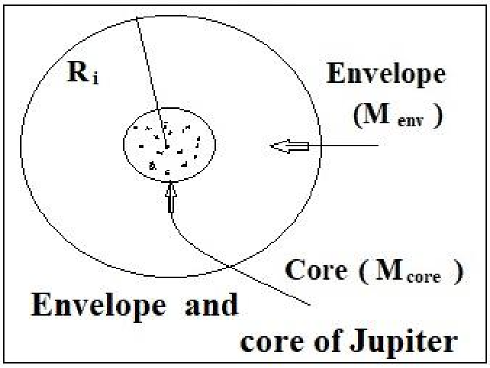
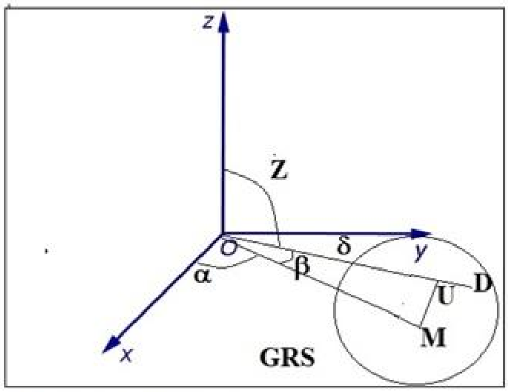
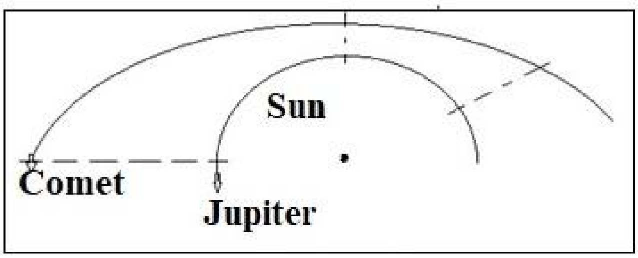


Figure 2



GRS on the Jupiter

Figure 3



The passage of a comet past Jupiter .

Figure 4

Heat formation, energy budget of Jupiter

Jupiter's moon Io - evidence for lava flows and volcanic activity. It radius is 1,821 km , should therefore have cooled off early and solidified. But, at the same time the interior may be heated by tidal heating. Io is in synchronous orbit around Jupiter it keeps the same face toward Jupiter at all times. Differential tidal force of gravity stretches axis of planet along planet-moon line2:1 resonance orbit with Europa. Io make two orbits for every one orbit that Europa. Makes causes constant distortion on Io's shape over its 1.8 days orbit of JupiterHeating during accretion is likely to be the largest heat source for Jupiter. The gain in energy due to accreting from a distance r is over a time dtis: $E_{acc}=(\frac{GM(r)}{r}-\pm(T^4(r)-T_0^4))dt$. If accretion is rapid, much of heat of accretion is stored inside planet Jupiter: $\frac{GM(r)}{r}\to C_J M\Delta T$. The rate of change of the mean internal temperature is therefore, $\frac{dT}{dt}=\frac{L}{C_J M}$,where C_J is the specific heat at constant volume (use C_J as assume adiabatic).Works well for Jupiter adiabatic heat transfer holds the fraction of the internal heat reservoir that gives rise to the observed luminosity(is very small) which is small compared to larger gas giants [7](see de Pater and Lissauer, Planetary Sciences, for further details).

Observations show Jupiter, Saturn and Neptune radiate more energy into space than they receive from the Sun (for some reason Uranus does not) => must have an internal energy source. Jupiter has ratio radiated to solar absorbed 1.67 0.08 and internal power 4 x 101Watts. Hence the Jovian planets are principally composed of gas and ice, radioactive heating will not be important (i.e. radioactive heating is very small). Consider a simple core plus envelope (see Figure 2) model of a Jupiter planet of total mass M_J, if the radius of the envelope changes from R_I to R_f conservation of energy requires then

$$\Delta E_k - \frac{GM_{env}M_{core}}{R_f} = \frac{GM_{env}M_{core}}{R_I} \qquad (1)$$

where ΔE_k is the (kinetic) energy produced by the contraction of the envelope (change in E_p). Therefore, we have $\frac{1}{R_f} - \frac{1}{R_I} = \frac{\Delta E_k}{GM_{env}M_{core}}$. For Jupiter: $M_{env} = M_{core} = \frac{M_{Jupiter}}{2} = 9{,}5.10^{26}\,kg$ $\Delta E_k = 4.10^{17}\,Watts\ R_I = 7{,}1.10^{7}\,m(present)$ .If $R_f = R_I + \Delta R$ Jupiter has to shrink by an amount $\Delta R = -1mm/yr$ .This rate of change in the radius amounts to 1 km in a million years –a change that is far to small to measure. Hence the excess energy radiated by Jupiter into space can be easily accommodated by small amounts of shrinkage in its gaseous envelope (see Figure 2.)

Energy generation and others energy source for rotation of Jupiter

The energy source is gravitational energy release through shrinking.

When material objects move in the gravitational field of the base object, there are secondary waves in the form of a shock cone. The solution to this problem in modern conditions is possible with the joint work of physicists and astronomers.
The presence of an attracting body entails over all space some substance, intensity in which at a point (x,y,z) is calculated by the formula

$$U(x,y,z) = \frac{GM}{\sqrt{(x-x_0)^2 + (y-y_0)^2 + (z-z_0)^2}}$$

here G is a constant, (x_0, y_0, z_0) coordinates of the attracting body, M is its mass. If $U_i = \sum \frac{GM_i}{\sqrt{(x-x_i)^2 + (y-y_i)^2 + (z-z_i)^2}}$ there is more than one attractive body, then if $r = \sqrt{(x-x_i)^2 + (y-y_i)^2 + (z-z_i)^2}$ then using, $\frac{\partial r}{\partial x} = \frac{x-x_i}{r}$, $\frac{\partial r}{\partial y} = \frac{y-y_i}{r}$, $\frac{\partial r}{\partial z} = \frac{z-z_i}{r}$ and differentiating them again, after adding them up we obtain that potential is $\Delta U = \frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2} + \frac{\partial^2 U}{\partial z^2} = 0.$ at $U = \sum U_i$. Finally, equilibrium the energy released is difference between gravitational energy of homogeneous body and body after differentiation:

$$E_g = -G\int_0^{r_{core}} \frac{M_{rJup} 4®r^2 °_{core}}{r} dr + G\int_{r_{core}}^{R} \frac{M_{r,o} 4®r^2 °_m}{r} dr. \qquad (2)$$

Jupiter may have dozens or even hundreds of undiscovered satellites orbiting it. This massive planet boasts a substantial gravitational field that allows it to trap space debris in its orbitJupiter currently has at least 79 satellites, and the number continues to grow. The small, oddly shaped space rocks rotate in the opposite direction to Jupiter's rotation and move at an extreme tilt relative to the plane of the giant planet's orbit. Astronomers suggest the asteroids are captured by Jupiter's gravity. So it makes sense to investigate gravitational energy. The new results help to constrain and improve existing evolutionary theories and models of Jupiter. Moreover, the significant dependence of Jupiter's albedo on wavelength suggests that the radiant energy and internal heat budgets of the other giant planets in our solar system should be reconsidered. Finally, data sets on the characteristics of Jupiter reflecting solar spectral radiation provide an observational basis for models of giant exoplanets. The energetic budgets of planets and satellites, which are mainly determined by absorbed solar energy and irradiative heat energy, play a crucial role in the thermal properties and evolution of these astronomical so –called as bodies1,2. For bodies with significant atmospheres, the radiant energy budgets at the top of their atmospheres impose critical constraints on the total energy of atmospheric systems. Since the satellites, which are mainly determined by the absorbed solar energy, we investigate the resultant gravitational potential of Jupiter.

Now, since Jupiter has at least 79 satellites, let's illustrate this on the problem of the attraction of 79 satellites (bodies). Let us denote $(x_i, y_i, z_i), i = 1,2,..,79,$ by the point coordinates of the satellites (bodies) $(V_i), i = 1,2,..,79,$ and let $°_i = °_i(x_i, y_i, z_i),$ the densities distribute the masses $(V_i), i = 1,2,..,79.$ But $(x_{Jupiter}, y_{Jupiter}, z_{Jupiter}),$ by the point coordinates of Jupiter and $°_J = °_J(x_J, y_J, z_J),$ let the densities distribute the masses $(V_{Jupiter}).$ Since the force is directed from the point $(x_J, y_J, z_J),$ to other points $(x_i, y_i, z_i), i = 1,2,..,79,$ then the same directional cosines will be $\frac{x_i - x_J}{r_{J,i}}$, where $r_{J,i} = \sqrt{(x_i - x_J)^2 + (y_i - y_J)^2 + (z_i - z_J)^2}$.. Then the projection F_x on resultant force with which the body of Jupiter $(x_{Jupiter}, y_{Jupiter}, z_{Jupiter})$, of other satellites (bodies) (see figure4) $(V_i), i = 1,2,..,79,$ and if we take that $(V) = (V_J) \times (V_1) \times ... \times (V_{79})$ it turns out that

$$F_x = \iiint\iiint_V \sum_{i=1}^{79} \frac{°_i \, °_J \, (x_J - x_i)}{r_{J,i}} dx_J dy_J dz_J dx_i dy_i dz..$$

So, the potential of gravity force for Jupiter‘s, with 79 satellites is expressed through 6-fold integrals (6- times integral). It is easy transform this integral to the 3-fold integral and substituting the suitable data, we can calculate above 6-fold integral.

Since the planets of Jupiter consist mainly of gas and ice, the radioactive heating would not make much difference. Jupiter is composed mainly of hydrogen. At low temperatures and pressures, H is an insulator in the form of the strongly bonded two-atom molecule H. Radiant energy budget and internal heat are fundamental properties of giant planets, H the precise determination of these properties remains a challenge. Here we report measurements of Jupiter's radiant energy budget and internal heat based on many instrumental Cassini observations. Our results show that Bond's albedo and Jupiter's internal heat, 0.503 ± 0.012 and 7.485 ± 0.160 W m-2, respectively, are significantly larger than 0.343 ± 0.032 and 5.444 ± 0.425 W m-2, previous best estimates. The new results (see [5],[6] and therein)help to constrain and improve existing evolutionary theories and models of Jupiter. Moreover, the significant dependence of Jupiter's albedo on wavelength suggests that the radiant energy and internal heat budgets of the other giant planets in our solar system should be reconsidered. Finally, data sets on the characteristics of Jupiter reflecting solar spectral radiation provide an observational basis for models of giant exoplanets. he energetic budgets of planets and satellites, which are mainly determined by absorbed solar energy and radiates heat energy, play a crucial role in the thermal properties and evolution of these astronomical bodies1,2. For bodies with significant atmospheres, the radiant energy budgets at the top of their atmospheres impose critical constraints on the total energy of atmospheric systems.

NOTE. In 1993 the Nobel Prize in Physics was awarded to astronomers Joseph Taylor and Russell Hulse, who managed to achieve indirect confirmation of the existence of gravitational waves. Also known from the discovery of gravitational waves was made by direct detection on 14 September 2015 by the LIGO and VIRGO science projects; the discovery was officially announced on 11 February 2016. The gravitational waves ushers in a new era of gravitational-wave astronomy, which is expected to provide a better understanding of the formation and galactic role of black holes, superdense balls of mass that bend space-time so steeply that even light cannot escape them. Gravitational waves alternately stretch and compress space-time vertically and horizontally as they propagate. In this sense, the influence of gravitational waves and gravitational forces in the energy balances are certainly not excluded for maintaining equilibrium and stability of GRS and Jupiter constant velocities. Thus, we can assume that the gravitational attraction effect of the theory is a difference in magnitudes of centrifugal velocities of individual objects, arising as a result of different local angles of inclination of the plane under the action of different inertial masses on the rotating in the 4th dimension of this plane of our space. Therefore, basics, the influence in the dynamic motion of Jupiter is also played by dark energy and gravitation (accordance to([9], [10])which these two forces are like centrifugal force of inertia acting with different magnitude for bodies. These above assumptions, although intuitive in nature, require accurate research which will awaken the interest of many researchers.

It is pertinent to note that the solar system has long been studied (see [7] and therein), so an additional source of energy, called internal heat or internal flux "Light" materials are those that combine with silicates; called lithophytes. Rise to the upper layers of the planet. The differentiation of materials by density allows for the formation of a complex layered structure within the planet.

Differentiation can be a great source of heat soon after formation. This rate of radius change is 1 km per million years, a change that is too small to measure. Consequently, the excess energy radiated into space by Jupiter could easily be absorbed by a small contraction of its gaseous envelope (See figure 2)

At a depth of several thousand kilometers below the upper cloud layer, the pressure becomes so high that H_2 becomes dislocated and undergoes a phase transition from gaseous to liquid state (see figure3). Therefore, the justification for the conservation of the stability of Jupiter's rotational motion would be cellular initiated by a study that provides about the conservation of the constancy of the velocity circulation around GRS, by a closed liquid.

Necessary and sufficient conditions for maintaining the stability of the rotational motion of Jupiter around the Sun

Now consider the centrifugal force as a Coriolis force. Jupiter rotates around the Z axis with angular velocity μ, although the GRS also rotates around the Z axis(See Figure 3) . Let's assume that GRS has a mass element $dm = °dV,$ away from the rotation axis $r = \sqrt{x^2 + y^2}$, the linear velocity will be $³ = r\mu,$ hence the kinetic energy $dE_k = \frac{1}{2} dm.³^2 == \frac{1}{2} r^2 .° \mu^2 dV.$ From this it is easy to obtain an expression for the kinetic energy E_k of the whole rotating body:

$$E_k = \frac{1}{2}\mu^2 \iiint_{(GRS)} ° r^2 dV = .\frac{1}{2}\mu^2 \iiint_{(GRS)} ° (x^2 + y^2) dV. \quad (3)$$

In the last integral we recall the moment of inertia I_u for GRS with respect to the axis of rotation. So, we have that $E_k = \frac{1}{2}\mu^2 I_Z .$ further, if $MD = ¢$ an arbitrary point $M(x.y.z)$ of GRS from axis U (figure 3) we have $¢^2 = r^2 - d^2$ as it is known from the theory of analytical geometry that $\mathbf{r^2 = x^2 + y^2 + z^2, d = x\cos\alpha + y\cos\beta + z\cos\gamma, \cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1.}$

Hence we obtain that $¢^2 = x^2(\cos^2 \ + \cos^2 ¥) + y^2(\cos^2 \sim + \cos^2 ¥) + z^2(\cos^2 \sim + \cos^2 \ ) - 2yz\cos \ \cos ¥ - 2zx\cos ¥ \cos\sim - 2xy\cos\sim \cos$. From this it is easy to obtain an expression for the moment of inertia I_u of the GRS as follows

$$I_u = \iiint_{(GRS)} °¢^2 dV = .I_X.\cos^2\sim + I_Y\cos^2 \ + I_Z\cos^2 ¥ - 2K_{yz}\cos \ \cos ¥ - 2K_{ZX}\cos ª \cos\sim - K_{XY}\cos\sim \cos$$ где

$$K_{yz} = \iiint_{(GRS)} ° yzdV,\ K_{zx} = \iiint_{(GRS)} ° zxdV,$$

$$K_{xy} = \iiint_{(GRS)} ° xydV.$$

I_u

These integrals are called products of inertia or centrifugal moments. Now, in order to represent the distribution of moments of inertia of GRS relative to different axes passing through the origin, then

$ON = \frac{1}{\sqrt{I_U}}$ (where u- the line passes through the origin).

Then we have $X = ON\cos\sim = \frac{\cos\sim}{\sqrt{I_U}}$,

$$Y = ON\cos \ = \frac{\cos}{\sqrt{I_U}},\ Z = ON\cos ¥ = \frac{\cos ¥}{\sqrt{I_U}}.$$

Hence, it easy to get the following

$$I_X X^2 + I_Y Y^2 + I_Z Z^2 - 2K_{YZ}YZ - 2K_{ZX}ZX - K_{XY}XY = 1.$$

Since ON does not collapse to infinity, this second-order surface is necessarily an ellipsoid and is therefore called an ellipsoid of inertia.Since the GRS rotates around the axis Z, with angular velocity μ, given the action of the elementary centrifugal force from the formula $dm = °dV$ we obtain that $dF = \mu^2 rdm == \mu^2 r° dV,$ where r is the distance of the element from the rotation axis. Hence its projections on the coordinate axes X,Y,Z have to

$$dF_x == \mu^2 x° dV, dF_y == \mu^2 y° dV, dF_z == 0.$$

Consequently, the resulting projection of the centrifugal force is expressed as follows

$$F_x = \iiint_{(GRS)} ° x\mu^2 dV = \mu^2 ¶ M_{yz}, F_y = \iiint_{(GRS)} ° y\mu^2 dV = \mu^2 ¦ M_{zx}, F_z = 0.$$

Where $¶, ¦, ¸$, is the center of gravity and the statistical moments are M_{yz}, M_{zx}, M_{xy} can be calculated in the following forms:

$$M_{yz} = \iiint_{(GRS)} ° xdV, M_{zx} = \iiint_{(GRS)} ° ydV, M_{xy} = \iiint_{(GRS)} ° zdV = 0,$$

$$m_{GRS} = \iiint_{(GRS)} ° dV,$$

$$¶ = \frac{\iiint_{(GRS)} ° xdV}{m_{GRS}},\ ¦ = \frac{\iiint_{(GRS)} y° dV}{m_{GRS}},\ ¸ = \frac{\iiint_{(GRS)} z° dV}{m_{GRS}} = 0.$$

So, the elementary centrifugal force of moments relative to the coordinate axis X,Y,Z is expressed as follows: $dM_x = zdF_y = \mu^2 yz° dV, dM_y = zdF_x = \mu^2 xz° dV, dM_z = 0.$

Hence, after integration, we obtain that $M_x = \iiint_{(GRS)} ° \mu^2 yzdV = K_{yz}, M_y = \iiint_{(GRS)} ° \mu^2 xzdV = K_{zx}, M_z = \iiint_{(GRS)} ° \mu^2 xydV == 0.$

It follows that for the Coriolis force to act on the GRS while maintaining a stable rotation around the axis Z, is a necessary and sufficient condition:

$M_{yz} = 0,\ M_{zx} = 0,\ K_{yz} = 0,\ K_{zx} = 0,$ (4)

As it shown in the work (e.g., [6]), external affecting on it $\vec{F}$ (Coriolis, gravitational, and other possible) has the potential $U : \vec{F} = gradU$, for example, a fluid located in a gravity field and directed along the Z-axis, in this case, U = -gZ could be taken since the GRS is projected on the plane (x, y, 0). Then circulation acceleration of motion GRS is

$$\frac{d\Gamma}{dt} = \frac{d}{dt}\int_{(L)} (V, dx) = \int_{(L)} a_x dx + a_y dy + a_z dz \quad (5)$$

Therefore we can formulate the following lemma.

Lemmas 3.1.Around GRS on a closed fluid circuit the time derivatives of the velocity circulation are equal to the acceleration circulation on this circuit

Proof. To prove lemma3.1 it is sufficient to differentiate under the integral expressions in equality (5), and taking into account $\frac{1}{2}(³_x^2 + ³_y^2 + ³_z^2) = \frac{1}{2}|³|^2$ From here consider that the contour (L) is an ellipse, then $\frac{1}{2}|³|^2 = 0.$ further, since the density is a single-valued function of the pressure P (e.g., [6]), and taking the notations $\Phi(°) = \int \frac{d°}{¨(°)}$ then we get that $\frac{\partial\Phi}{\partial x} = \frac{\partial\Phi}{\partial °}.\frac{d°}{dx} = \frac{1}{°}\frac{d°}{dx}, \frac{\partial\Phi}{\partial y} = \frac{\partial\Phi}{\partial °}.\frac{d°}{dy} = \frac{1}{°}\frac{d°}{dy}, \frac{\partial\Phi}{\partial z} = \frac{\partial\Phi}{\partial °}.\frac{d°}{dz} = \frac{1}{°}\frac{d°}{dz}.$ From this we obtain that $grad\Phi = \frac{1}{°}gradP.$ So, by Newton's law (e.g.,[1]), it is justified that the basic equation of hydrodynamics $°dV\vec{a} = \vec{F}°dV - dVgradP$ is satisfied and hence it follows that $\vec{a} = \vec{F} - \frac{1}{°}gradP.$ Here is the acceleration corresponding to the element $(dV).$ Consequently, from the acceleration circulation (5) it follows that $\frac{d\Gamma}{dt} = \int_{(L)} a_x dx + a_y dy + a_z dz = \int_{(L)} d(U - ¤) = 0.$

Then we obtain than $\Gamma = const$ proves that the velocity circulation around GRS in a closed fluid circuit is constant. The existence conditions of ovals, vortices, laminar flows and turbulent transition (e.g., [5], [6]), which is provide for the constancy of velocity circulation around GRS, on a closed fluid circuit and will be for many years. Thus, lemma3.1 is fully proved.

Since the motion on fluid circuits around the GRS refers to the approximate, so-called, quasi-laminar, then under the condition of incompressibility, $div\vec{V} \to 0, rot\vec{V} = £,\ for£ \to 0.$, In this case equations of motion, which is described for a sufficiently distance from the center of GRS , satisfying more general equations: $\frac{\partial\overline{V}}{\partial t} + div(°\vec{V}) = 0,\ \frac{\partial\overline{V}}{\partial t} + (\overline{V}, \nabla)\vec{V} = -\frac{1}{°} gradP.$

Therefore, we can prove that the following theorem is true.

Theorem 3.1(About conservation of vortex lines). Particles of liquid, around GRS forming vortex lines, at any time, and at all times of motion form vortex lines, coming from their origin, through ovals and swirled parts of liquid.

Proof. In order to prove Theorem 3.1, it suffices to start relatively vortex thin surfaces [5].

Let $(\pm_0)$ there be a surface at the $t = t_0;$ moment of time, then in each of its $\vec{\Omega} = rot\,^{3}$ vortex velocities $\Omega_n = 0.$ If we take on $(\pm_0)$ surface any (L_0) closed contour bounding a part of surface, then by Stokes formula it will be true $\int_{(L)} {}^3{}_x dx + {}^3{}_y dy + {}^3{}_z dz = \iint_{(L_0)} \Omega_n d\pm = 0.$

At the moment of time the surface $(\pm_0)$ will pass to surface $(\pm),$ and its part $(s_0) \to (s)$ but, liquid (L_0) contour will pass to liquid contour $(L).$ Again by Stokes formula we have that $\iint_{(L_0)} \Omega_n d\pm = 0.$

Since, being arbitrary $(\pm),$ we easily get that along $(\pm),$ is identical $\Omega_n = 0.$ So, $(\pm),$ surface turns to be vertical. Hence, taking into account that vortex lines can be always considered as an intersection of of two vortex surfaces, the theorem is proved. Now the following theorem can be easily proved.

Theorem 3.2 (about conservation of intensity of vortices). The intensity of any vortex (in particular the tube) remains constant at all times.

Proof According to Stokes formula, the intensity of the vortex flows, across a cross section is given by the circulation velocity of that section, and then by Theorem 3.1 easily proves Theorem 3.2.

Theorem3.3 (main). Let conditions of Lemma3.1, Theorem3.1 and Theorem 3.2 be fulfilled, and the Rossby conditions of free, cyclone, anticyclone, and, besides, if quasi-laminar and turbulent fluid flow around the BCP exist, then the necessary and sufficient conditions for the existence of stability of constant GRS rotation and the Jupiter' s balance, the internal and external energy balances of Jupiter are preserved.

Proof. Since in the papers ([5], [6]) considered the inclusion factors cyclone, anticyclone and Rossby's conditions of feasibility vortex flows and ovals of laminar flow with the transition to turbulent flow of rotational fluid m gas around BKP, the conditions of lemma 3.1 , theorems 3.1,3.2 are automatically satisfied. Consequently, the internal energy balances will be preserved, in order to ensure the stability of dynamics of rotational motion of GRS, Jupiter, is preserved. Thus as stated in papers ([5], [6]) it is mentioned that 68 percent of the energy of Jupiter is internal, the remaining external is always ensured through - Io the moon , also through the gravitational, kinetic initial moments, very small influence of solar radiation are always recovered. Since the acceleration of the circulation is equal to zero on the closed liquid circuits around of GRS, the synchronous rotation of the of GRS, Jupiter is stable at all times provided by some conditions. To prove the sufficient conditions it is satisfied the equality (1),(2),(3).

CONCLUSION

The paper firstly gives the facts and compares some results to create new continuous theory grounded treatises to assume the preservation of stability of Jupiter's rotational motion around the Sun. By means of a rigorous, mathematically well-founded treatise the assumption of the stability of the rotational motion of Jupiter around the Sun is proven. This is based on new work by the authors who have recently considered the influence of cyclones, anticyclones, circulation and rotation factors on the stable dynamics of Jupiter's GRS and new mathematical treatises on the dynamics of Jupiter's GRS. Based on these results, as well as previously known methods of fluid dynamics and non-classical approaches in the form of lemma, the theorem is justified that cyclones, anticyclones, circulations and rotational motions of GRS create conditions to apply vortex motions along the closed fluid loop of GRS. Moreover, the mathematical treatises on the steady-state dynamics of GRS make it possible using the circulation and rotational momentum theory, based on the equations of hydrodynamics, Coriolis force, through momentum statistics to formulate the lemma and theorems on the circulation acceleration, the theorem on conservation of vortex lines which describes the full rotational motion dynamics of Jupiter. The main results obtained are expressed as Lemma 3.1 and Theorem 3.1. Theorem 3.2 and Theorem 3.3 which are based on proven trace problems like heat generation, Jupiter's energy budget energy production and other energy sources for Jupiter's rotation. These considered facts show the necessary and sufficient conditions for maintaining the stability of the rotational motion of Jupiter around the Sun.

Account into above conclusion directly we can represent obtained results in the following: Considering directly the above conclusion, we can present the obtained results as follows:

1. Jupiter has at least 79 satellites, the problem of the attraction of 79 satellites (bodies) was illustrated and the

projection to the resultant force can be calculated using the 6-fold integral;

2. The main source of GRS dynamics in Jupiter's atmosphere interacting with the magnetosphere and solar wind and gravitational energy;
3. The motion of gas and liquid at GPC is divided into three processes which connect laminar (or approximate, so called quasi-laminar) and transient flow by ovals to turbulent flow;
4. Diffusive-convective reaction processes and their descriptive equations related to the global dynamics of the GPC on Jupiter are considered;
5. Circulation on arbitrarily closed counter of fluid around on GRS is identically equal to zero;
6. Necessary and sufficient conditions for existence of stability of constant rotation of GRS and equilibrium of Jupiter, internal and external energy balances of Jupiter are preserved;
7. Intensity of any vortex (in particular, a tube) of liquid around GRS remains constant at all times;
8. 8)The velocity circulation of the fluid around the GRS is equal to the acceleration circulation on this circuit;
9. 9)All times of motion form vortex lines in the liquid around the GDS going from its origin, through ovals and swirling parts of the liquid.

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