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SUBSTANTIATION OF THE NECESSITY CHANGE OF SOME NOTIONS AND GENERAL THEOREMS OF THE THEORETICAL MECHANICS

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The discovered contradictions and mutual influences of known notions and general theorems of theoretical mechanics are the next in turn developed origin and impact factor of classic mechanics and of professional technical education of the specialists.

Movement quantity of a flat cylindrical solid in rotation relative to its immobile turn axis of materiel symmetry is absent, because the speed of its mass center is zero. By this, it arise a contradiction between presence of rotation movement of a massive solid and absence of the quantity of this movement. It is necessary introduce to theoretical mechanics the new notion about rotation movement quantity of a solid, that is equal to product of its angular speed vector and distribution parameter of mass relative to turn axis, for remove indicated contradiction. The distribution parameter of mass represent itself a scalar value, that is equal to a sum of products of every material point's mass of solid to square of its distance until turn axis and it influence to inertia of rotation movement of solid (as to as the mass of a solid influence to inertia of its translation movement).At present such scalar value is named by moment of inertia of the solid relative to its turn axis [1, p. 242].

However, it is necessary to name by moment of inertia of a solid relative to rotation axis a vector value, that is equal to a product (take with sign minus) of its angular acceleration vector to its distribution parameter of mass relative to turn axis, on analogy with a inertia force. Unfortunately, at present the product of angular speed of a solid to its distribution parameter of mass is name (historical) by its kinetic moment relative to turn axis [2, p. 125].

There is an absurdity, on that «...a speed of moment change is equal to moment...», because the derivation on time of kinetic moment of a mechanical system relative to its turn axis (or center) is equal to main moment of exterior forces relative to that axis (or center) [3, p.153]. It is necessary to change the formula of general theorem of theoretical mechanics about change of the kinetic moment of a mechanical system relative to its turn axis (or center), for remove indicated absurdity.

It is known primordial, that a material point represent itself a solid in two cases, if one can to disregard by its dimensions and if its movement is translation, that is the movement quantity of material point is equal to a product of its mass and speed vector. When the orientation of the body change in the space one can't take it for a material point, it is necessary to use other theorem [2, p. 14].

The movement quantity vectors of material points of a solid in plan movement are not mutual parallel. On this cause, the position of solid's mass center can't be defined by formula for the center of parallel forces. The solid revolve a round instantaneous acceleration center (IAC) in plan movement. Therefore, it is necessary take into account the correlation between its movement quantities with mass center and with IAC in dynamics. Known differential equations of plan movement of a solid are composed without impact factor of IAC.

So long as a changeable mechanical system (or a solid) can participate simultaneously in a few movements, it is necessary change the formula of general theorem about change of the movement quantity of a mechanical system with calculation impact factor of the correlation between different movement quantities.

The movement amount of spherical movement of a solid is defined as a sum of three rotation movement quantities (precession, notation and own rotation), that have the same size unit; but there are two problems. First problem is tied with so, that a supplementary acceleration must appear because of mutual influence of additional rotations, that is the general acceleration of spherical movement must be defined as a sum of four instantaneous accelerations. Second problem is tied with names of additional accelerations.

The module of angular accelerations of additional rotations of spherical movement, after lead to its turn axis, determine as the sums [4, p.114]:

$$\begin{cases} \varepsilon_{\psi} = \psi'' + \psi'\theta' / tg\theta - \theta'\varphi' / Sin\theta, \\ \varepsilon_{\varphi} = \varphi'' + \theta'\varphi' / tg\theta - \psi'\theta' / Sin\theta, \\ \varepsilon_{\theta} = \theta'' + \psi'\varphi' Sin\theta, \end{cases} \quad \ldots\ldots\ldots \quad (1)$$

where $\varepsilon_{\psi}, \varepsilon_{\varphi}, \varepsilon_{\theta}$ – number meaning of the lead angular accelerations (of precession, notation and own rotation); ψ, φ, θ – angles of Euler; ψ', φ', θ' – derivations on time of Euler's angles; $\psi'', \varphi'', \theta''$ – meaning of the angular accelerations (of precession, of own rotation and notation), without registration of mutual influence of additional rotations.

The number meaning of each lead angular acceleration is equal to sum of its

number meaning until lead plus corresponding supplementary acceleration, stipulated by mutual influence of additional rotations. The sum algebraic of supplementary accelerations of three additional rotations is equal to number meaning of supplementary acceleration of spherical movement.

The vector of angular acceleration of spherical movement is equal to sum of four vectors [5, p. 18]:

$$\overline{\varepsilon} = \overline{\varepsilon}_{\psi} + \overline{\varepsilon}_{\varphi} + \overline{\varepsilon}_{\theta} + \overline{\varepsilon}_{\triangleright} \quad \ldots\ldots\ldots\ldots\ldots \quad (2)$$

where $\overline{\varepsilon}$ – vector of angular acceleration of a solid in spherical movement; $\overline{\varepsilon}_{\psi}, \overline{\varepsilon}_{\varphi}, \overline{\varepsilon}_{\theta}$ – the accelerations angular, accordingly, of precession, own rotation and notation, without registration of mutual influence of additional rotations; $\overline{\varepsilon}_{\triangleright}$ – the acceleration supplementary of a solid in spherical movement, that is equal to the sum [6, p. 5]:

$$\overline{\varepsilon}_{\triangleright} = (\overline{\omega}_{\psi} \times \overline{\omega}_{\varphi}) + (\overline{\omega}_{\varphi} \times \overline{\omega}_{\theta}) + (\overline{\omega}_{\theta} \times \overline{\omega}_{\varphi}), \ldots\ldots\ldots\ldots \quad (3)$$

where $\overline{\omega}_{\psi}, \overline{\omega}_{\varphi}, \overline{\omega}_{\theta}$ – angular speeds, accordingly, of precession, own rotation and notation.

The supplementary angular acceleration of a solid in complicated movement is equal to sum of three vector products of three vectors, but the supplementary linier acceleration of a point in complicated movement is equal to double vector product of two vectors.

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ТЕОРИЯЛЫҚ МЕХАНИКАНЫҢ КЕЙБІР ТҮСІНІКТЕРІ МЕН ЖАЛПЫ ТЕОРЕМАЛАРЫН ӨЗГЕРТУ ҚАЖЕТТІГІН НЕГІЗДЕУ

Теориялық механиканың белгілі түсініктері мен жалпы теоремаларының аралығында байқалған қайшылықтардан құтылу үшін дененің екпін моменті, дененің айналу қозғалыс мөлшері, механикалық жүйенің кинетикалық моменті сияқты түсініктерді өзгерту қажет. Дененің айналу өсіне қатысты массасының таралу параметрі, қозғалыстағы дененің қосымша бұрыштық үдеуі сияқты бірқатар жаңа түсініктерді енгізу, кейбір белгілі жалпы теоремаларының мазмұнын өзгерту және бірқатар ережелерін жетілдіру қажет. Бұл амалдар классикалық механиканы кезекті дамытуының негізін қалайды.

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ОБОСНОВАНИЕ НЕОБХОДИМОСТИ НЕКОТОРЫХ ПОНЯТИЙ И ОБЩИХ ТЕОРЕМ ТЕОРЕТИЧЕСКОЙ МЕХАНИКИ

Для устранения замеченных противоречий между известными понятиями и общими теоремами теоретической механики, предлагается изменить некоторых понятий как момент инерции и количество движения тела, кинетический момент механической системы. Предлагается вводить ряд новых понятий, таких как параметр распределения массы тела, дополнительное угловое ускорение тела и изменить содержания некоторых общих теорем механики и совершенствовать другие положения. Эти меры закладывают основу очередного развития классической механики.