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## On the possibility of refining the gravitational constant and solving the task of integrating the gravitational and electromagnetic fields

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Currently gravitational constant $G$ is defined up to 5 characters, that is 2 or 3 orders of magnitude less than the accuracy of other fundamental physical constants – the speed $c$ of light in vacuum and Planck's constant h. However in the Earth conditions the possibility of increasing the accuracy of defining $G$ experimentally has reached its technical limit, which requires the search of new fundamental approaches. For this purpose the original approach is suggested and the system of calculated dependences resulted from fundamental physical constants $c$, $G$, $h$, as well as from Planck's values of length $l_p$, time $t_p$ and mass $m_p$, is obtained allowing to refine the presently known value of the gravitational constant $G$ by 3 orders. Scientific discoveries are put of the solution this problem:

1) The possibility of expressing the fundamental physical constants in the framework of their dimension in terms of their Planck's values $l_p$, $t_p$, $m_p$ [1] found in which for the gravitational constant $G$ amounts to (1) [2]:

$$G\left(\frac{m^3}{kg \cdot s^2}\right) = \frac{l_p^{\ 3}}{m_p t_p^{\ 2}} = 6.67394 \cdot 10^{-11} \left(\frac{m^3}{kg \cdot s^2}\right).$$

2) Next transformed constant $G$ of this basis^ $G = \frac{t_p^{\ 2} c^5}{h} = \frac{c^5}{v_p^{\ 2} h}$.

3) this allowed on a strict basis to determine the wave parameters of the gravitational field: $v_p = \sqrt{\frac{c^5}{Gh}} = 7.40004 \cdot 10^{42}\left(s^{-1}\right)$

4) 1-th work hypnotize of this: paper $v_p$ – is quantum parameter of time 1 second [3] and can be expressed by an exact number of $v_p = 7.4 \cdot 10^{42}(s^{-1})$ Of this basis gravitational constant, at the strict physical (3) and mathematical level, amounts the value with the accuracy of up to 9 characters (4) [4]:

$$G = \frac{c^5}{v_p^{\ 2} h} = \frac{\left[0.299792458 \cdot 10^9 \left(\frac{m}{s}\right)\right]^5}{\left[7.4 \cdot 10^{42}\left(s^{-1}\right)\right]^2 6.62606957 \cdot 10^{-34}\left(J \cdot s\right)} = 6.67396744(30) \cdot 10^{-11}\left(\frac{m^3}{kg \cdot s^2}\right)$$

Taking into account the obtained wave characteristics [5] it can be strictly maintained that gravitational field can only by unified with electromagnetic field having the same wave characteristics. Thus, It can be summed up that unification of given fields is possible only on Plank's level. This conclusion is confirmed number physical and mathematical level [5].

### General conclusions and recommendations.

1. It was for by calculation up to 9 characters which accurate, a new magnitude of gravitational constant (4).

2. Strict constancy of the frequency of the waves of gravitational field $v_p = const$ (3), excludes the possibility of the unification of gravitational and electromagnetic fields on other levels except Plank's ones with wave length $\lambda_p$.

### Biography

Valentyn A Nastasenko, the Kherson State Maritime Academy Ukraine, faculties Electrical engineering and electronics, the department of transport technologies. Sphere of scientific interests includes quantum physics, the theory of gravitation, fundamentals of the material world and the birth of the Universe, the author of 50 scientific works in these spheres.

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Page 61