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## Strict justification of the force of the gravitational field

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Currently, the force of the gravitational field is assumed to be estimated by the value  $F_G$  of the gravitational interaction of two-point bodies of mass  $m_1, m_2$  (kg) located at a distance  $r$  (m) between them, which follows from the Law of Universal gravitation discovered by Newton:

$$F_G = G \frac{m_1 m_2}{r^2} (H). \quad (1)$$

where  $G$  – gravitational constant.

However, the force  $F_G$ , found for the interaction of point objects, cannot strictly characterize the gravitational field having a spatial structure that encompasses the entire sphere of the observable Universe. Therefore, the application of Newton's law to determine this force is incorrect. In the work performed, this drawback is eliminated on the basis of the found parameters of the waves of the gravitational field: the frequency  $\nu_G$ , the wavelength  $\lambda_G$ , the energy of this wave  $E_G = h\nu_G$  (where  $h$  is Planck's constant), and the mass equivalent  $m_G$  of this wave, which are related to the speed of light in vacuum  $c$  by the following dependence:

$$m_G = \frac{E_G}{c^2} = \frac{h\nu_G}{c^2} (kg). \quad (2)$$

Herewith, the total mass  $m_2$  of waves of the gravitational field in the law (1) is replaced by its equivalent  $Nm_G$ , where  $N$  is the number of wavelengths in the distance  $r$  to any object of mass  $m_1$ , which makes up the value  $N=r/\lambda_G$ , which allows us to find a new strict physical dependence for the force  $F_G$ :

$$F_G = G \frac{m_1 N h \nu_G}{r^2 c^2} = G \frac{m_1 r h \nu_G}{\lambda_G r^2 c^2} = G \frac{m_1 h \nu_G}{\lambda_G r c^2} = \frac{G h \nu_G}{\lambda_G c^2} \times \frac{m_1}{r} (N). \quad (3)$$

Since the constants  $G, h, c, \nu_G$ , and  $\lambda_G$ , under their dimensionality, can be expressed in terms of Planck's values length  $l_p$ , time  $t_p$  and mass  $m_p$ , we obtain the following:

$$\frac{G h \nu_G}{\lambda_G c^2} = \frac{\left( \frac{l_p^3}{m_p t_p^2} \right) \times \left( \frac{m_p l_p^2}{t_p} \right) \times \left( \frac{1}{t_p} \right)}{(l_p) \times \left( \frac{l_p}{t_p} \right)^2}. \quad (4)$$

Taking into account the value of (4), we finally obtain a strict physical dependence for calculating the force  $F_G$ :

$$F_G = c^2 \frac{m_1}{r} = \frac{m_1 c^2}{r} (N). \quad (5)$$

It follows from the dependence (5) that the force  $F_G$  of the action of the gravitational field on the object of mass  $m_1$  is energetic, it is directly proportional to the total energy of the mass of selected body and is inversely proportional to the distance  $r$  between it and any chosen point of the gravitational field. This dependences (3)...(5) can be qualified as scientific discoveries.

## Biography

Valentyn Alekseevitch Nastasenko, the Kherson State Maritime Academy Ukraine, faculties Electrical engineering and electrics, the department of transport technologies. Professor of the department of transport technologies candidate of Dr. technical sciences. A sphere of scientific interests include quantum physics, the theory of gravitation, fundamentals of the material world and the birth of the Universe. Author of more than 50 scientific works in these spheres.

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