Answer on Question #66791, Physics / Astronomy | Astrophysics

Derive an Expression for the tidal force for the earth- moon system and show that its magnitude depends on the latitude. Explain tidal bulge on the basis of this expression.

Answer:

Disregarding the size, structure and shape of the moon, we will write down the specific gravity of the attraction of the test body located on the Earth. Let **r'** be the radius vector directed from the test body to the side of the moon, r' is the length of this vector. In this case, the force of attraction of this body by the moon will be

$$F = \frac{GM_m}{r'^3}\boldsymbol{r'}$$

Where, GM_m is the selenometric gravitational constant

The test body will be placed at point P. The attraction force of the test body placed in the center of mass of the Earth will be equal to

$$F_0 = \frac{GM_m}{r^3}\boldsymbol{r}$$

Here, **r** and r means a radius vector connecting the centers of the masses of the Earth and the Moon, and their absolute values.

Tidal force we will call the difference of these two gravitational forces

$$F_{tf} = F - F_0$$