Earth's mass overestimated

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As method of calculation of Earth's mass by analysis of movement of the Moon is disproved, mainstream hardly has other method to calculate Earth's mass. Raw estimate of Earth's density is possible, using data from vortical celestial mechanics.

Fig. 1 **Earth interior.** From Athanasius Kircher, *Mundus Subterraneus*, 1665. *Credit: alamy.com*

Basic data for geophysics stems from 17th century. As U.S. Geological Survey tells us "*three centuries ago, the English scientist Isaac Newton calculated, from his studies of planets and the force of gravity, that the average density of the Earth is twice that of surface rocks and therefore that the Earth's interior must be composed of much denser material*".

I modern language Earth mass **M**, obtained from orbital parameters of its satellite, is thought as**:**

$$\frac{P^2}{a^3} = \frac{4\pi^2}{MG} \quad \Rightarrow \quad M = \frac{4\pi^2 a^3}{GP^2} = \frac{4\pi^2 \left(3.844\cdot 10^8 \text{ m}\right)^3}{\left(6.673\cdot 10^{-11} \ \frac{\text{m}^3}{\text{kg}\cdot\text{s}^2}\right)\left(2.361\cdot 10^6 \text{ s}\right)^2} \approx 6\cdot 10^{24} \text{ kg}$$

were **P**- orbital period of the Moon, sec, **a**- mean orbital distance of the Moon, m, **G**-gravitation constant.

What gives density of the Earth over **5.5**- biggest in the solar system. Because mean density of magma is below **3.0**, scientists needed large piece of iron to be put in Earth's centre in order to balance global mean density: "*It is therefore impossible to explain the high density of the Earth on the basis of compression alone. The dense interior cannot consist of ordinary rocks compressed to a small volume; we must therefore fall back on the only reasonable alternative, namely, the presence of a heavier material, presumably some metal, which, to judge from its abundance in the Earth's crust, in meteorites and in the Sun, is probably iron"* (Williamson and Adams, 1923).

Problem with above mentioned calculation is, that "Newton's modification of Kepler's Third Law" is not universal. Big **G** in equation is factor, which connects solar mass and solar rotation with planetary motion. For the Earth, for example

$$\textbf{SOLAR MASS} * \textbf{G} = 4\pi^2 * (\textbf{1 astronomic unit})^3 / (\textbf{1 year})^2$$

Because the Sun is considered gaseous, liquid (Robitaille, 2007) or in supercritical state (Alksnis, 2018), but the Earth interior- solid (Fowler, 2004), here should be differences by connection of self-rotation of central body with orbital movement of secondary. Newton's version of Kepler's 3-rd law compares only masses of central bodies in systems like the Sun-Mercury and the Earth- Moon (fig.2) and assumes, that distant effects from self-rotation of all celestial objects can be compared with that from the Sun, knowing only mass differences.
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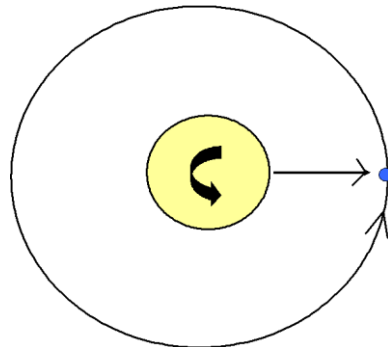
Fig. 2 Real meaning of Newton's modification of Kepler's Third law-DesCartes vortex.

Looks like author had driven Wikipedia page "Earth mass" backing university in panic. Kepler's/Newton's rule cannot be find here. First they tells us nice tautology

$$M_{EARTH} = G * M_{EARTH} / G$$

then revisit flawed Cavendish experiment (Mathis !!!!) and finally take pendulums in hand. In order to use objects like asteroid Eros in Earth's mass determination, it will be reasonable to understand nature of disturbing effect from the Earth to asteroid. However, here are several effects, named "non-gravitational perturbations". In short, scientists hardly have a method to calculate Earth's mass.

Newton's modification of Kepler's Third law historically has been derived from comparison, from one side, diameters of the Sun, Jupiter and Saturn and, from another side, orbital parameters of their satellites, which represent Keplerian proportion A^3/P^2. Recently Wang has demonstrated in experiment in the bowl, that vortical geometry gives exactly proportion A^3/P^2 (here A- distance to the center of a bowl, P- time for one complete circle for "secondary body").

Unfortunately none of mainstream accepted planetary origin theories look reliable (Lovett, 2011). Furthermore, Venus and Mercury obviously had changed places in solar system (cf. Velikovsky, 1950). Venus is also not quite "in it's place" due to absence of prograde rotation. This creates problems for theory, which states, that planets are formed by solar explosion- and that suggestions about their iron content can be drawn from this fact (DeMees, 2005). Help in certain extent here can offer celestial mechanics. In vortical celestial mechanics (Wang, 2012) heaviest planets should stay closer to the Sun, so position of Earth in comparison with that of Venus is clearly impossible (Table 2):

Planet	Mean orbital distance, m	Density, g/cm^3	Mass, kg	Half of surface area, m^2
Mercury	5.79×10^{10} m	5.43	3.30×10^{23}	3.74×10^{13}
Venus	1.08×10^{11} m	5.24	4.87×10^{24}	2.30×10^{14}
Earth	1.50×10^{11} m	5.51 (?!)	5.97×10^{24}	2.55×10^{14}
Mars	2.28×10^{11} m	2.75*	4.49×10^{23}*	7.24×10^{13}

Table 2. Data of inner rocky planets. *- assumed value.

Thus in reality Earth can contain not more than 15-20% of iron (not 32.1% as is thought today), what lowers Earth's density till some **3.8** (taking in account some possibly underestimated internal water). It will be interesting to know, how geophysical data can be explained other way to fit in low density Earth model.

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