How variable Earth-Moon distance really could be?

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New understanding of physical background of “Newton’s modification of Kepler’s Third law” allows us revisit significantly variable prehistoric lunar distance idea.

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Origin of distance of the Moon has always been a mystery for mainstream science. Age of lunar radar ranging come together with Slichter’s dilemma:

“Slichter (1963) reanalyzed the Earth-moon torque by devising a new way to use the entire ellipsoid of Earth rather than treating it as a series of approximations. He decided that, depending on the specifics of the model, the moon would have started out very close to Earth anywhere from 1.4 billion to 2.3 billion years ago, rather than 4.5 billion years ago. Slichter remarked that if "for some unknown reason" the tidal torque was much less in the past than in the present (where "present" means roughly the last 100 million years), this would solve the problem. But he could not supply the reason, and concluded his paper by saying that the time scale of the Earth-moon system "still presents a major problem" (Thompson, 2000).

Outsider may think that prehistoric lunar distances are firmly known by analysis of tidal rhythmites. However, reading between the lines in Kvale et al. (1999) shows that situation is more complex.

Thus idea about variable distance of the Moon in the past (Avsyuk, 1993) can save the face of science. However, outside of some extraordinary events like “disastrous love affair of Moon and Mars” (de Grazia, 1984) here is no physical mechanism available for larger variations of lunar distance in the past.

Chaldeans reportedly had a solar and lunar eclipse tables five millennia ago- hard to believe achievement with current lunar distance. Also folklore contain strange warning not to sow grains during solar eclipse- an event which today can happen maybe once in a century.

Fresh look to physical meaning of “Newton’s modification of Kepler’s Third Law” (Alksnis, 2018) allows us to propose mechanism for variable Moon distance- variable properties of Earth’s rotation created vortex in the past. Earth’s spin created Cartesian vortex with tangential and radial pressures (fig.1) is the cause of Keplerian $\mathbf{A^3/P^2}$ movement of the Moon.

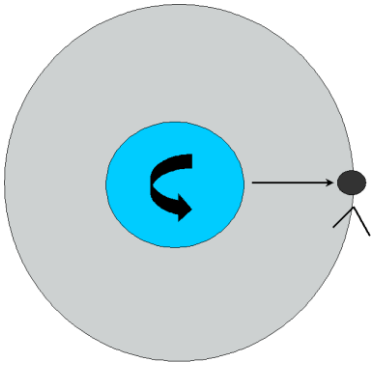

Fig.1 Vortical forces behind the 3-rd law of Kepler.

Author had proposed, that strength of central vortex depends also from spinning speed and physical constitution of central celestial body. Correction of Newton than could be:

$$\mathbf{V*d*\omega_{eq}*k= A^3 / P^2}$$

were **V-** volume of primary, cubic meters, **d-** density of primary, kilograms per cubic meter, ω_{eq}**-** equatorial rotation speed, radians/sec, **k-** coefficient, showing, how effective is vortex of central body in transfer of angular momentum "through the vacuum" to secondary celestial body relative to calculated $\mathbf{V*\omega_{eq}}$, **A**- mean orbital distance, m, **P**- orbital period of secondary celestial body, sec.

Table 1. shows us, that terrestrial vortex currently indeed is more effective than that of small planets Haumea and Eris despite proportionally larger mass of the Moon.

Primary	Volume V, m^3	Equatorial rotating speed, ω_{eq} rad/sec	Secon-dary	Mean orbital dis-tance A, m	Period P, sec	k* d
93 Minerva	1.48E+15	2.92E-04	Gorgo-neion	3.75E+05	9.59E+04	1.33E-05
22 Kalliope	2.40E+15	4.22E-04	second	1.10E+06	3.11E+05	1.34E-05
107 Camilla	5.52E+15	3.61E-04	third	3.40E+05	4.32E+04	1.06E-05
45 Eugenia	5.12E+15	3.06E-04	Petit Prince	1.18E+06	4.12E+05	6.19E-06
217 Kleopatra	1.03E+16	3.25E-04	Cleoselene	5.64E+05	1.07E+05	4.66E-06
87 Sylvia	1.22E+16	3.36E-04	Remus	7.06E+05	1.19E+05	6.10E-06
Eris	6.59E+18	6.73E-05	Dysnomia	3.73E+07	1.36E+06	6.30E-05
Haumea	1.10E+19	4.44E-04	Hi'iaka	4.99E+07	4.32E+06	1.36E-06
Earth	1.08E+21	7.22E-05	Moon	3.84E+08	2.36E+06	1.30E-04

Table 1. Proportional calculations

Author suggests, that coming "geomagnetic pole shift" should temporary weaken Earth's vortex and therefore reduce lunar orbit. Changes of effectivity of Earth's vortex by same Earth's spinning speed should affect Keplerian $\mathbf{A^3 / P^2}$ linearly. Thus for speculative mythological situation when solar diameter looks about 2/3 of lunar one and lunar month has 36 days we get $\mathbf{k*d}= 2.16*10^{-5}$. It is not clear, of course, could these parameters coincide.

References

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