"ORIGIN OF THE MOON". Tadeusz Tumalski; Private researcher; (Im Trutz Frankfurt 18, 60322 Frankfurt; Germany; Email: Tadeusz.Tumalski@aranea.de)

Introduction: During a shift of the inner core from the center of the earth mass eccentricities develop which are produced by the difference in density between the inner and outer core. The gravity force counteracts the shift of the inner core, whilst the centrifugal force of rotation supports it. With a sufficiently fast rotation of the earth the centrifugal force would compensate the gravity force. By this the limit of stability would be reached. Such fast rotation caused the outburst of the first inner core of the earth from the mantle 4-5 billions of years ago. The core of the earth formed the moon on the orbit around the earth.

The forces in the interior of the earth [2]: During a shift (a) Fig. 1 of the inner core from the center of the earth, two mass eccentricities (1) and (2) – the gravity force acting between them –

$$\Delta m_{G2} = \frac{4}{3}\pi\, a^3\, \rho_2 \qquad (1)$$

$$\Delta m_{G3} = \frac{4}{3}\pi\, a^3 (\rho_3 - \rho_2) \qquad (2)$$

and a rotational mass eccentricity (3) develop:

$$\Delta m_\omega = \frac{4}{3}\pi\, a^3\, \rho_3 \qquad (3)$$

ρ_2, ρ_3 - the linearised density of the outer and inner core

The gravity force between (1) and (2) is described by the following formula (4):

$$\mathbf{F}_{G\Delta m} = G\,\frac{\frac{4}{3}\pi\, a^3 (\rho_3 - \rho_2)\cdot \frac{4}{3}\pi\, a^3\, \rho_2}{a^2} = \qquad (4)$$

$$= G\,\frac{16}{9}\pi^2 (\rho_3 - \rho_2)\,\rho_2\, a^4$$

The centrifugal force acting on mass (3) is described by the following formula (5):

$$\mathbf{F}_{\omega\Delta m} = \Delta m_\omega\, \omega_R^2\, a = \frac{4}{3}\pi\, a^3\, \rho_3\, \omega_R^2\, a = \qquad (5)$$

$$= \frac{4}{3}\pi\, \omega_R^2\, a^4\, \rho_3$$

ω_R – rotational speed of the earth

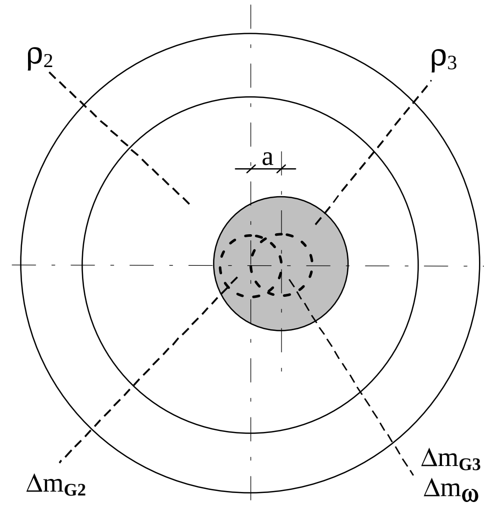

Fig. 1.: The meridional cross section of the earth a - shift of the inner core from the center of the earth

In (6) we calculate the relationship between the forces (4) and (5):

$$\frac{|\mathbf{F}_{G\Delta m}|}{|\mathbf{F}_{\omega\Delta m}|} = \frac{G\,\frac{16}{9}\pi^2\, a^4 (\rho_3 - \rho_2)\,\rho_2}{\frac{4}{3}\pi\, \omega_R^2\, a^4\, \rho_3} = \qquad (6)$$

$$= G\,\frac{4}{3}\pi\,\frac{1}{\omega_R^2}\left(1 - \frac{\rho_2}{\rho_3}\right)\rho_2$$

Formula (6) permits us to calculate the limit of stability of the rotating earth:

$$\frac{|\mathbf{F}_{G\Delta m}|}{|\mathbf{F}_{\omega\Delta m}|} = 1 \qquad (7)$$

From (6) and (7) we obtain (8):

$$1 = \frac{4}{3}G\,\pi\,\frac{1}{\omega_R^2}\left(1 - \frac{\rho_2}{\rho_3}\right)\rho_2 \qquad (8)$$

With a simple transformation of (8) we obtain (9):

$$\frac{4\pi^2}{T^2} = \frac{4}{3}G\,\pi\left(1 - \frac{\rho_2}{\rho_3}\right)\rho_2 \qquad (9)$$

and from this the day's length of the limit of the earth

"ORIGIN OF THE MOON": Tadeusz Tumalski

stability (10):

$$T = \frac{1}{\sqrt{\frac{1}{3\pi} G \left(1 - \frac{\rho_2}{\rho_3}\right) \rho_2}} \qquad (10)$$

$G = 6{,}6726 \cdot 10^{-8}\ cm^3/g \cdot s^2$ and today's values [3] of the density of the outer and inner core:
ρ_2=12,1 g/cm^3, ρ_3=12,8 g/cm^3
yield:

$$T = 14610{,}036\ [s] = 4{,}058\ [h] \qquad (11)$$

The number from (11) means that with a day length of T=4,058 hours our today's earth would be at the limit of rotational stability.

During the last 4.6 billion years the earth day was extended by about 20 hours [1] which means that 4,6 billion years ago the earth was rotating with the limit period of 4 hours.

Also 4,6 billion years ago the rocks in the older regions of the moon were molten. This was found when the moon rocks from the Apollo Program were examined.

This time relationship proves that, approx. 4,6 - 5 billion years ago, by the quick rotation of the young earth its first inner core was centrifuged from the thin mantle into the space. On the orbit the core was then collecting the fragments of the mantle and the lava of the outer core of the earth. Some parts of the earth stemming from deep inside, were collected as last by the moon and are now forming the so-called mascons on its surface, similar than the maria.

After the outburst of the first core the earth closed its mantle again and formed the second inner core.

The density paradox of the moon: The mean density of the moon is

$$\rho_M = 3{,}344\ g/cm^3$$

The density of rocks which the Apollo missions brought to the earth from the moon ranged between 2.8 – 3.4 g/cm^3. With an increasing depth also the density inside a celestial body is growing. From the physical and mathematical standpoint, it is, therefore, not possible that the mean density of the moon is lower than the smallest value of the density of the outer layers of the moon crust.

If the moon had developed from the first core and fragments of the earth its mean density would have to be more or less identical with the density of today's earth. However, the mean density of the moon is only 60.5% of the mean density of the earth.

There is only one explanation for this paradox. The moon must have hollow spaces inside which also confirms the herein presented process of the development of the moon. During its development the moon was rotating only very slowly. The first inner core of the earth pressed the still liquid lava through the young and thin crust of the moon towards outside. In this way the maria on the moon and the empty spaces inside the moon developed.

This means that the interior of our today's moon must be as is shown in Fig. 2.

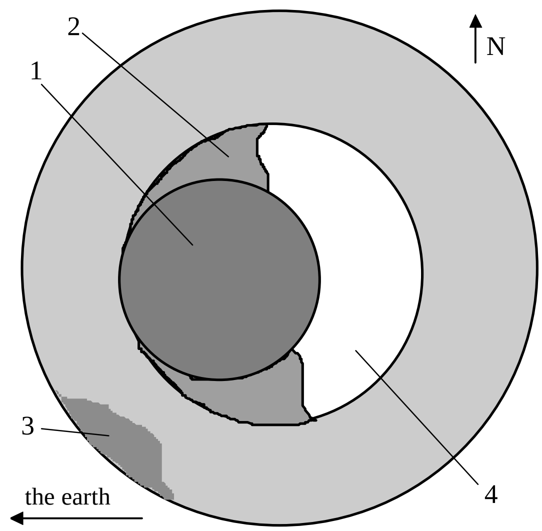

Fig. 2. The cross section through today's moon.
1 - the first inner core of the earth
2 - the solidified lava from the outer core of the young earth
3 - mascons on the surface of the moon
4 - hollow space

Seismograms of moon-quakes lasting up to 100 min, clearly demonstrate the existence of hollow spaces inside the moon which is a further proof for the thesis that our moon is a kind of cosmic pumpkin.

References:

[1] Roman Teisseyre et al. (1983) PAN, *Fizyka i Ewolucja Wnętrza Ziemi* 591–594.
[2] T. Tumalski *Antriebsmechanismus der Plattentektonik* DGG (1998) ISSN-Nr. 0947-1944; 112-121
[3] Harro Schmeling 1997 (*Email to T. Tumalski*)