COMMENTS ON 'THE ORIGIN OF THE EARTH–MOON SYSTEM'

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Abstract. The main points are presented of a new hypothesis of the origin of the Earth–Moon system, developed on the basis of Savić's (1961) theory of the origin of rotation of celestial bodies. The cooling off and contraction due to gravitational attraction on vast particle systems, with the pushing out of electrons from atom shells result in a continually increasing density. Depending on the amount of mass, this pushing out can lead to the expulsion of electrons and the creation of a magnetic field by which a rotational motion is brought about. These conditions are satisfied for the Earth's mass and all larger masses. If the Earth and the Moon formed a unique body, the protoplanet, then once rotational motion had begun, the primeval spherical body must have taken the shape of a large Jacobi ellipsoid. New condensation followed, however no longer solely around the centre of the protoplanet, but also along the edge of the ellipsoid, the process leading to the creation of the dual Earth–Moon system.

1. Introduction

The theories of the origin of the solar system and of some of its parts, e.g. the Earth–Moon system, have not been capable so far of providing satisfactory explanations and solutions. This state of affairs might be explained by the following:

(1) The coming into existence of such a system is a very complex phenomenon, a result of a large number of factors, so many that the theories could not embrace them all, but singled out only some of the agencies — mostly those mechanical in character neglecting the others.

(2) In treating this topic little attention has been paid so far to the behaviour of the materials, especially where large masses are concerned.

(3) No proof whatever is on hand of the immutability of the fundamental constants of natural laws over longer time intervals and it is a big question whether extrapolation is permissible of their present-day properties and values into the remote past.

It is the purpose of the present paper to offer a contribution to the point (1) and, in particular, to the point (2). Unfortunately, we are denied the possibility of contributing anything to clear up the question under (3); accordingly, natural laws and constants as we know them at the present will be considered unalterable with the time.

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In our considerations we will rely on Savić’s (1961) theory of the origin of rotation of celestial bodies, and on Savić–Kašanin’s (1962, 1963, 1964, 1965) theory of the behaviour of materials under high pressures, both theories being assembled in Savić and Kašanin (1976). The origin of the rotation of celestial bodies is described in paragraphs 13–16 of the monograph IV (1965) of the Savić–Kašanin theory. This explanation bears, one might say, a phenomenological character, since many phenomena in the Earth’s interior and in the ‘cold’ plasma are not yet known; still it demonstrates the possibility of such an occurrence. Among the questions related to this matter is that of the final direction and sense of the magnetic moment. In paragraph 15 the decisive part played by the magnetic moment of the first atom is anticipated. However, as the orbital moment has no definite direction, one is entitled to assume the final magnetic direction to be a product of a fortuitous coupling of moments of all atoms in an electron-deficient layer. On the assumption that the magnetic moment direction is determined by an accidental process in bodies containing several electron-deficient layers, changes of the direction and intensity of the magnetic moment of that body should be possible. Thus the changes in the Earth’s polarity might be accounted for. However, it should be underlined that this reasoning holds only for the case where the body concerned is completely isolated. If a body is forming and developing in a medium in which a magnetic field already exists, the latter will influence – perhaps predominantly – the orientation of the magnetic moment of the layer and the body as a whole. The fields of influence of very large masses (galaxies, stellar clusters, stars, etc.) are illustrative examples.

2. Discussion

The fundamental principle of Savić’s (1961) theory is the following: every large mass, formed of atoms of elements, must, irrespective of its chemical composition, undergo stratification, as a result of its spontaneous cooling and contraction due to gravitational attraction, as the electrons in atom shells are compressed and finally ejected from their atoms under the growing pressure of the weight of materials – once the pressure has attained the ionization potential. In the layer in which the electrons have left their atoms, a magnetic field is created, giving rise, through the coupling of forces, to the rotation of that layer. Now this layer in turn, through the friction of the phase surfaces (contact surfaces) sets the whole system in rotation. In this, the correlation is of greatest importance between the discrete structure of electron shells of any material, magnetic field, rotational motion and the mass of the system of particles. This means that a minimum mass is required to bring about rotation of the whole body. These conditions are satisfied for the mass of the Earth and masses exceeding it.

This reasoning, in conjunction with the previously established accordance of a whole range of factors, is now applied to our consideration of the Earth–Moon system.