Observational effects of the lunar core-mantle differential rotation.

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The differential rotation of the rigid mantle and liquid core in the Moon, the interaction between them is responsible for the formation of specific transition zone - core-mantle boundary that play an important role in observed phenomena. Seismic data obtained from Apollo mission give the magnitude of dissipative factor $Q \sim 1000$ fast greater than that from LLR analyses $Q \sim 26$. Solid tidal friction does not explain the great rotational dissipation. There are serious validity for the proposal about important role of the core-mantle processes on the rotation of the Moon. Dissipative effects arising from the core-mantle interaction are responsible for additional heating of the planet's interior, causing convective motion in the mantle and grows of the lunar lithosphere; for the exciting and maintaining of free librations in the Moon; for arising of plumes that are responsible for the formation of possible hot spots and ”mascons” in the crust. We propose that ”mascons” in the thick lunar continental crust might be produced by convective processes in the upper mantle of the Moon at the early stage of its thermal evolution If proposed hypothesis is true, the specific surface characteristics should be observed:

- the pluton-like intrusions (”mascons”),
- specific fluctuations of thermal (”warm spot”), gravitational fields,
- the Moho uplifts,topographic features in the form of arched lineament. In the frame of the Hamilton approach, by analysing of the differential rotation equations of two-layer Moon composed of the rigid mantle and liquid core we have obtained the period of the free core nutation equal to 144.73/yr. We have also estimated the differential core-mantle rotation rate equal to 2.4 degree/yr. In this connection many new cosmic experiments - Lunar A, Euromoon, SELENE, SMART - will give a possibility to determine the size and composition of a lunar core, the magnetic and heat characteristics of the Moon.