SIMILAR SHAPES OF ASTEROID EROS, SATELLITE ATLAS, AND COMET HARTLEY 2 DESPITE OF DIFFERENT CLASSES, ORBITS, SIZES AND COMPOSITIONS OF THESE BODIES; G.G. Kochemasov, IGEM of the Russian Academy of Sciences, 35 Staromonetny, 119017 Moscow, kochem.36@mail.ru

The wave planetology states: "Orbits make structures" [1-3 & others]. Only one fundamental feature of keplerian orbits – their non-circular (elliptic or parabolic) character – causing periodically changing celestial bodies accelerations is a main reason for stimulation in them undulations or wave warpings. Having in mind large, if not huge, celestial bodies masses (m) and significant cosmic speeds variations along non-circular orbits (much more significant in the beginning of planetary systems formation), thus important accelerations (a), one must accept that enormous inertia forces (F=m x a) act upon all shells of the bodies. This inertia-gravity forces in rotating bodies (but all bodies rotate!) divide into four ortho- and diagonal directions and produced by them standing waves-warpings (undulations) interfere. The fundamental wave1 long $2\pi R$ produces ubiquitous tectonic dichotomy. That is why all rotating globular bodies along with some ellipsoid formation (the polar compression) have more or less expressed global scale bulges and antipodean depressions (Earth with the uplifted continental and subsided Pacific hemispheres is one of the best known examples).

The mighty gravity in large bodies keeps however their on the whole globular shape. Drastically different is a body shape of small cosmic bodies (normally less than 400 to 500 km across). Produced by the warping wave1 oblong and convexo-concave forms often adorned with signs of the Plato's figures (an action of wave2 and smaller waves in harmonics [1-3]) are widespread (a majority of the Main belt asteroids are oblong and convexo-concave ones) [4].

Traces of warping waves of four directions are often seen on surfaces of many celestial bodies as cross-cutting lineations. A recent example of the small core of the Hartley 2 comet is very impressive. At received points of view are clearly seen at least three ortho- and diagonal lineations often marked by small outgassing craters (Fig. 1, 8, 9). Crossing lineations produce square forms (craters) earlier seen on the Eros' surface. Wave compression lineations make the Hartley 2 to appear as a wafer cake. A "waist" (neck) is formed as a result of nearing a concave depression, from one side, and deep cracks at the convex bulge, from the antipodean side (Fig. 1-9).

Figs.1-3 and 5-7 support the wave shaping of small bodies; a model of this process is in Fig. 4.

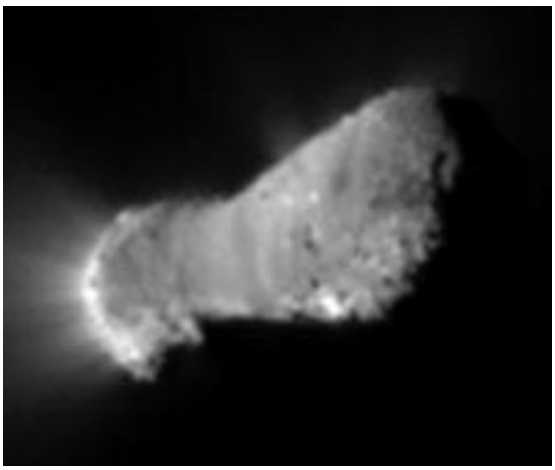

Fig. 1. Hartley 2, 2 km long, Credit: NASA/JPL-Caltech/UMD.

Fig. 2. Calypso (22 km long, PIA07633)

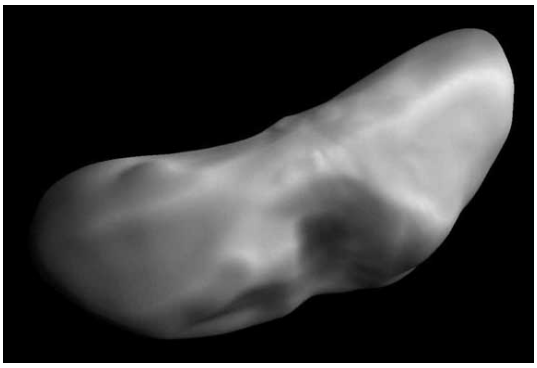

Fig. 3. Eros (33 km long, PIA03111)

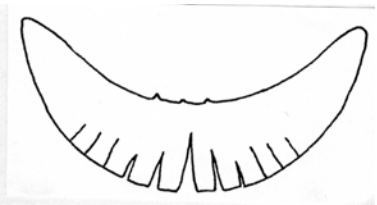

Fig. 4. Geometrical model of convexo-concave oblong shape of a small celestial body caused by the wave1 warping. Deep cracks of the convex hemisphere and the concave hemisphere cause development of a "waist" or 'neck" and finally lead to a body breakage

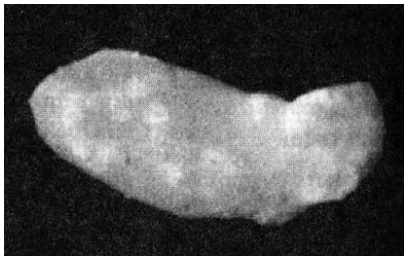

Fig. 5. Itokawa (0.5 km long)

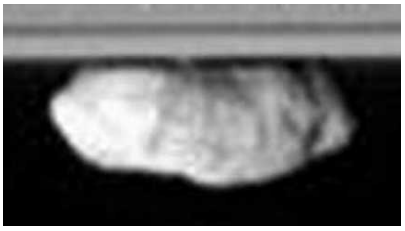

Fig. 6. Prometheus (102 km, PIA08192)

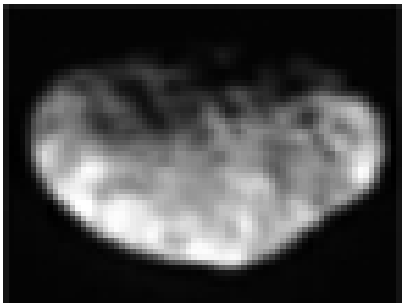

Fig. 7. Hyperion (350 km, PIA06645)

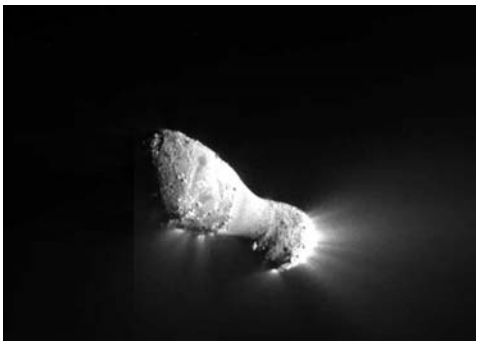

Fig. 8. Hartley 2 asteroid (2 km long)

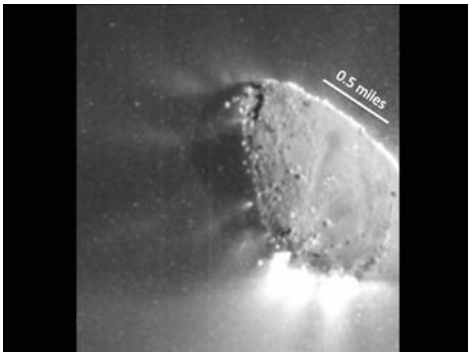

Fig. 9. Hartly 2 asteroid.

References: [1] Kochemasov G.G. (1999) Geophys. Res. Abstr., 1,(3), 700 . **[2]** . Kochemasov G.G. (1998) Proc. Intern. Symp. on New Concepts in Global Tectonics, "NCGT-98 TSUKUBA", Geol. Survey of Japan, Tsukuba, Nov 20-23, 144-147. **[3]** Kochemasov G.G. (2004) In Workshop on "Hemispheres apart: the origin and modification of the martian crustal dichotomy", LPI Contribution # 1203, LPI, Houston, 37-38. **[4]** Kochemasov G.G. (1999) On convexo-concave shape of small celestial bodies // "Asteroids, Comets, Meteors" conference, Cornell Univ., U.S.A., July 1999, Abstract # 24. 22

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