ASTEROID FAMILIES: STATISTICAL IDENTIFICATION OF NEW FAMILIES AND DETERMINATION OF SIZE DISTRIBUTIONS OF FAMILIES' MEMBERS

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Statistical method of identification of the asteroid families is proposed. It is based on searching for the local heterogeneities of the asteroid distribution density in the space of the proper elements *a, e, i,* appropriately scaled in the units of length. The procedure are performed in the spherical area $\Omega[AU^3]$ centered in several asteroids. The method was tested on the well recognized families, and next it was applied for searching of the new ones. In Fig. 2 there are given some examples of space distribution of asteroids in the families (Fig. 2, upper row) as well as in the vicinities of the asteroids non-having the families (Fig. 2, lower row). For the families the sharp pick in the vicinity of main family member is clearly visible. Large data set (130037 numbered asteroids) is used. So, the population of identified families is considerably more numerous than it is given by the literature. For the first 200 numbered asteroids we have identified 12 previously known families as well as we discovered 10 new families. Of these the most populated are the families 73 Klytia and 46 Hestia with 1300 and 420 members, respectively. For all considered families the size distributions in the power-law form were determined. The diameters of the family members are $D = 1329 \cdot 10^{-H/5} p^{-1/2}$ [km]. Here H is the absolute magnitude of the asteroid and albedo p of all asteroids is assumed to be the same and equal to 0.15. The size distributions are aimed to be interpreted on the basis of modelling of impact disruption processes.
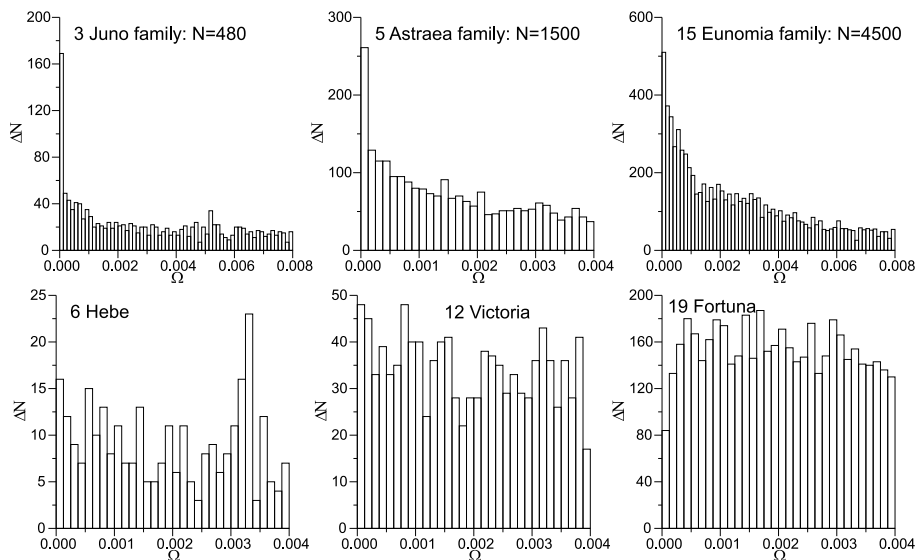

Figure 2: Examples of distribution of asteroids ΔN [asteroids/bin] versus volume $\Omega[AU^3]$ in the proper elements space.