

Orbital similarity among the near Earth asteroids

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Similarity between the orbits among the NEAs was discovered ~40 years ago. Drummond, among 708 NEAs found 14 associations of 4-25 members. However, he believed that many his groups might be attributed to chance alignments. Further studies made by different researchers did not bring conclusive results. Therefore, whether the NEAs associations of a common origin exist is an open question.

In this study we made a search for grouping amongst ~18000 NEAs. Using different orbital similarity measures (D- and rho- functions) and rigorous cluster analysis approach, we found about a dozen groups of 20 or more members. Estimated numerically, statistical reliability of this finding is quite high, 95%. Of course, by a cluster analysis technique only, one cannot decide about a common origin of some association.

This notwithstanding, we believe that the existence of the NEAs orbital associations is undisputed fact, they were found just like one detects the meteoroid streams. The origin of them is an open concern.

Recognition of the NEAs orbital associations is an important issue, because of their serious threat to the Earth. Analogously to a meteoroid stream, each year the Earth is almost crossing the orbits of the members of each association.

To facilitate monitoring of new members of the NEA association we have calculated coordinates of its theoretical radiant and the calendar date of its potential activity. This information may be useful when planning on the observation campaigns of these hazardous objects.