

## **Preliminary results of search studies of predicted hypothetical objects beyond the orbit of Jupiter**

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In paper [1] on the basis of the external variant of the restricted circular three-body problem we calculated the most probable orbits of hypothetical asteroids moving in orbital commensurability with Jupiter. Using the obtained orbital elements we calculated the equatorial topocentric coordinates of area localization of the predicted objects and the zones (area of "average daily motion") most probable for their discovery:  $164''.08 \div 173''.06$ ,  $175''.60 \div 184''.56$ ,  $185''.90 \div 213''.42$ ,  $215''.44 \div 230''.74$ . Estimation of probable orbits was based on evident assumption that the sought asteroids can exist long time if the elements of their orbits are within the areas of orbital stability, i.e. areas of stability of motion.

The orbital resonance interactions with Jupiter result in perturbation effects upon parameters like "areas of stability". For some zones of internal part of the main asteroids belt the effects of orbital resonance interactions with Mars [2] are prevailing ones.

As earlier predicted in [3] on the basis of similar theoretical considerations (planetary variant of the restricted elliptical three-body problem) about existence of the libration-stable orbits in the Kuiper belt more than 200 objects, moving in orbital resonances of Lindblad with Neptune, are already discovered..

Beginning in 2000, observations aimed to find hypothetical "resonance objects" related with Jupiter have been performed in Simeiz observatory of Russia (by means of telescope "Zeiss-1000", CCD ST-6) and in international observatory "Peak Terscol" (telescope "Zeiss" GAO UAS, CCD "Photometrics").

In result of search observations there were discovered several candidates for sought hypothetical objects at the limit of sensitivity of the used equipment ( $19.5 \div 20.0$  mag.). The upper estimate of the brightness of these objects has been found as well.

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## References

1. Gerasimov I. A., Mushailov B. R. On existence of extra-orbit libration asteroids of Jupiter. *Cosmic Research.*, 1995, 3–33, 317–320.
2. Gerasimov I. A., Mushailov B. R. On evolution of asteroids orbit, being in orbital commensurabilities with Mars. *Solar System Research.*, 1992, 4–26, 32–38.
3. Gerasimov I. A., Mushailov B. R. On existence of Kuiper belt objects in orbital resonance with Neptune. *Bulletin. Moscow Univ., ser. 3*, 1999, **1**, 53–59.