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Dynamics of the Earth co-orbital objects

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Investigations of co-orbital motion of small bodies associated with the Earth are performed. At present there are known orbital elements of about twenty co-orbital asteroids of Earth. The orbital behaviour of a few newly discovered objects is studied (for example: 2002 AA 29, 2003 YN107, 2004 GU9, 2005 CN61, 2006 FV 35). Some of them exhibit interesting dynamics (horseshoe-type orbits and horseshoe-quasi satellite transitions). The time evolution of such orbits as well as their clones within about 1000 years forward and backward is investigated. Possible transitions between different types of orbits (e.g. from passing orbits to horseshoe ones) are analyzed. The equations of motion have been integrated in barycentric coordinates using the recurrent power series method taking into account the perturbations of all planets and the Moon.