

# **Influence of joint perturbations from Jupiter and Saturn on the chaotical behaviour of orbits of minor planets**

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The aim of our research is to study the influence of joint perturbations from Jupiter and Saturn on the evolution of orbits of minor planets and on the formation of chaotical domains in the main asteroid belt. For solving this problem we integrate numerically the equations of motion of several thousands of real and fictitious minor planets injected into some three-body resonances "Asteroid-Jupiter-Saturn" over several millions years with the simultaneous computation of Lyapunov-Exponent. For determination of influence of joint Jovian-Saturnian perturbations on the value of Lyapunov-Exponent we consider the cases with two disturbing bodies (Jupiter and Saturn) and one disturbing body (Jupiter or Saturn), that gives a possibility to analyze, under what conditions the joint perturbations from Jupiter and Saturn (in particular, mixed-resonant perturbations) can be responsible for large values of Lyapunov-Exponent and, as a result, for the origin of chaos in motion of minor planets. We study also the dependence of Lyapunov-Exponent on the eccentricity and inclination of asteroid orbit in domains of mixed resonances "Asteroid-Jupiter-Saturn" and dependence of order of three-body resonance on semi-major axis, at which the corresponding mixed-resonance can be responsible for the chaotical behaviour of asteroid orbits. On the basis of our numerical experiments we are able to make some preliminary conclusions, in what cases the mixed-resonant perturbations can lead to formation of chaotical domains in the asteroid belt. These cases should be investigated more in detail in the future with the help of semianalytical approach. The author thanks DFG (Deutsche Forschungsgemeinschaft) for the financial support of this research.