RESONANCES IN THE ASTEROID AND TNO BELTS

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Abstract: Mean motion resonances are the main responsible for the distribution of small bodies in the asteroid and transneptunian populations. The last decades gave us a detailed explanation of the dynamics as well as the process of capture of resonant motions in the case of coplanar or small inclination orbits [1]. More recently, semianalytical or numerical methods allowed us to explore the behavior of resonant motions for arbitrary inclination orbits [2], [3]. The emerging dynamics of inclined resonant orbits is very rich allowing in some cases to large orbital variations due to the interaction between mean motion resonances and Kozai mechanism [4]. Moreover, several weak three body resonances were identified in the asteroid belt, mainly with Jupiter and Saturn [5], [6], [7]. The process of capture in high inclined or retrograde resonant orbits was also addressed showing that the capture in retrograde resonances is more efficient than in direct ones [8]. Numerical explorations in the transneptunian region showed the relevance and the particular dynamics of the exterior resonances with Neptune [9] which can account for some of the known high eccentricity orbits in the scattered disk [4].

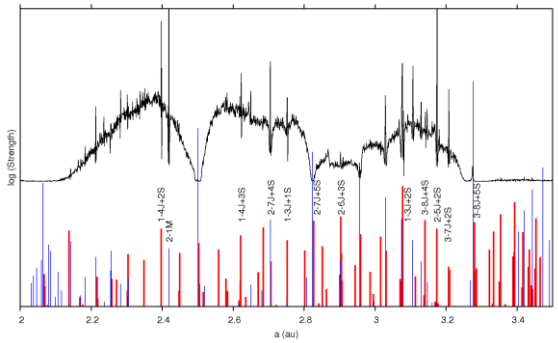

Figure 1. Histogram of proper semimajor axes (black) with some relevant two body (blue) and three body (red) resonances in the asteroid belt [7].

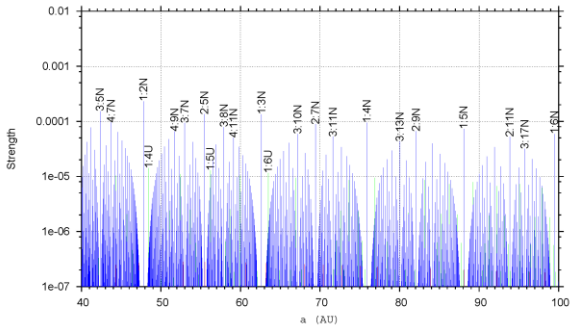

Figure 2. Mean motion resonances in transneptunian region. Resonances of the type 1:n with Neptune are the strongest and more isolated ones. Some resonances with Uranus are also showed [2].

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