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Title: *"AMD-Stability of planetary systems"*

Abstract. In a planetary system, the AMD (Angular Momentum Deficit) is the difference between the planar circular angular momentum and the total angular momentum. This quantity is conserved between collisions in the average system, and decreases during collisions. It was introduced to understand the long-term evolution of the solar system (Laskar, 1997), and shows how the process of accretion of planetesimals can give rise to distributions of the planets that are functions of the initial distribution of matter in the disk (Laskar, 2000).

This leads to the concept of AMD-stability. A planetary system is AMD-stable if the AMD in the system is not sufficient to allow collisions. The advantage of this notion is that it becomes possible to verify very quickly whether a newly discovered planetary system is stable or potentially unstable, without any numerical integration of the equations of motion. These principles have been applied to the 131 multiple planetary systems of the exoplanet.eu database whose orbital elements are sufficiently well determined (Laskar and Petit, 2017a).

AMD-stability, based on the secular evolution, addresses to long time stability, in absence of mean motion resonances. On the other hand, criterions for short term stability have been established on the basis of Hill radius (Marchal & Bozis 1982; Gladman 1993; Chambers et al. 1996; Smith & Lissauer 2009; Pu & Wu 2015) or on the overlap of mean motion resonances (Wisdom 1980; Duncan et al. 1989; Mustill & Wyatt 2012; Deck et al. 2013). Both long and short time scales can be in fact combined owing some modification of the AMD-stability criterion (Petit, Laskar & Boué, 2017).

References

Laskar, J. and Petit, A.C., 2017, AMD-stability and the classification of planetary systems, A & A, in press.

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