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**Title:** *“Long term motion and rotation of Ceres and Vesta”*

**Abstract.** The spacecraft Dawn has studied Ceres and Vesta, the heaviest asteroids of the main belt, and has allowed to refine their physical characteristics and their rotation motions. Dawn should also constraint the ice distribution on the surface of Ceres but this requires to know the long term orbital and rotation motions of Ceres.

A long term integration of the Solar system (Laskar et al. 2011) has allowed to obtain a long term solution for Ceres and Vesta and has shown that their orbital motions are chaotic. From this integration, we obtain a secular solution for Ceres and Vesta, where the secular frequencies, which play an important part in the long term dynamics, can be identified. The rotation motion is then deduced from this orbital solution. We obtain the evolution of the angular momenta of Ceres and Vesta with a secular model, where the fast rotational motion of the planet is averaged. This computation needs the constant precessions, which are expressed as a function of some physical characteristics of Ceres and Vesta. Dawn has determined their gravitational flattenings but the polar moments of inertia, which depend on the internal structure, are not well constrained. From this model, we can study the long term stability of the angular momenta and the influence of the planetary perturbations on the long term rotation.

Joint work with Jacques Laskar and Nicolas Rambaux.