

Numerical Exploration of the Limit Ring Problem

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Abstract The aim of this work is to provide an insight of an idealized model of a planetary ring. The model is a limit case of the planar circular restricted $1 + n$ body problem, where an infinitesimal particle moves under the gravitational influence of a large central body and n smaller bodies located on the vertices of a regular n -gon. When considering n tending to infinity, a model depending on one parameter is obtained. We study the main important structures of the problem depending on this parameter (equilibria, Hill's regions, linear stability, ...). We use Poincaré maps, for different values of the parameter, in order to predict the width of the ring and the richness of the dynamics that occur is discussed. This work is a continuation of the work presented in Barrabés by (SIAM J Appl Dyn Syst 9:634–658, 2010).

Keywords Celestial Mechanics · N body problem · Planetary rings

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