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Symmetric planar non–collinear relative equilibria for the Lennard–Jones potential 3–body problem with two equal masses

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Abstract

In this paper we study the planar relative equilibria for a system of three point particles with only two equal masses moving under the action of a Lennard–Jones potential. A central configuration is a special position of the particles where the position and acceleration vectors of each particle with respect to the center of mass are proportional, and the constant of proportionality is the same for all particles. Since the Lennard–Jones potential depends only on the mutual distances among the particles, it is invariant under rotations. In a convenient rotating frame the orbits coming from central configurations become equilibrium points, the relative equilibria. Due to the form of the potential, the relative equilibria depend on the size of the system, that is, depend strongly of the momentum of inertia I of the system. In this work we characterize the symmetric planar non–collinear relative equilibria and we give the values of I depending on the parameters of the Lennard–Jones potential for which the number of relative equilibria changes.

Key words and expressions: Central configurations, Lennard–Jones potential, relative equilibria

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