ORIGINAL ARTICLE

New central configurations for the planar 5-body problem

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Abstract   In this paper we show the existence of three new families of planar central
configurations for the 5-body problem with the following properties: three bodies are on the
vertices of an equilateral triangle and the other two bodies are on a perpendicular bisector.

Keywords   Planar central configurations · 5-Body problem

1 Introduction

The classical *n-body problem* in celestial mechanics consists in studying the motion of n
pointlike masses, interacting amount themselves through no other forces than their mutual
gravitational attraction according to Newton's gravitational law (Newton 1687). The equa-
tions of motion are given by

$$\ddot{r}_i = - \sum_{\substack{j = 1 \\ j \neq i}}^{n} m_j \frac{r_i - r_j}{r_{ij}^3}, \tag{1}$$

for $i = 1, 2, \ldots, n$. Here the gravitational constant is taken equal to one, $r_j \in \mathbb{R}^d$ for $d = 2, 3$
is the position vector of the punctual mass m_j in an inertial system and $r_{ij} = |r_i - r_j|$ is the
Euclidean distance between m_i and m_j.

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