

# Planar 4–body central configurations with two parallel lines

Montserrat Corbera

Departament de Tecnologies Digitals i de la Informació

Facultat de Ciències i Tecnologia

Universitat de Vic. \*

May 14, 2016

## Abstract

We consider central configurations of the planar four–body problem with the four masses located by pairs on two parallel lines. Assuming that the positions of the masses  $m_1$ ,  $m_2$ ,  $m_3$  and  $m_4$  are  $\mathbf{q}_1 = (0, 0)$ ,  $\mathbf{q}_2 = (0, a)$ ,  $\mathbf{q}_3 = (1, b)$ , and  $\mathbf{q}_4 = (1, c)$ , we characterize the region  $\Omega$  in the space  $(a, b, c)$  that provides central configurations. In particular, we prove that if the configuration satisfies  $r_{12} \geq r_{23} \geq r_{14} \geq r_{34}$  (this is not restrictive by labeling the names of the masses conveniently), then  $\Omega$  is like a “triangle” whose three boundaries correspond to the isosceles trapezoid family, the rhombus family, and a family of degenerate central configurations with three masses at the vertices of an equilateral triangle and a fourth infinitesimal mass, respectively.

This is a work in progress, joint with Josep M. Cors (UPC), Ernesto Pérez–Chavela (UAM-I), and Jaume Llibre (UAB).

---

\*montserrat.corbera@uvic.cat, <http://www.gsd.uab.cat>