

NON-COLLISION PERIODIC SOLUTIONS FOR A CLASS OF SYMMETRIC 3-BODY TYPE PROBLEMS

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Dedicated to Jean Leray

1. Introduction

In a recent paper [1] we have proved the existence of a periodic *weak* solution (see [2] for the definition; see also Section 2 below) with prescribed negative energy h for some Hamiltonian systems of N -body type, that is, solutions of

$$(1) \quad m_i \ddot{x}_i + \nabla_{x_i} V(x_1, \dots, x_N) = 0, \quad 1 \leq i \leq N,$$

such that

$$(2) \quad \frac{1}{2} \sum_{i=1}^N m_i |\dot{x}_i(t)|^2 + V(x_1(t), \dots, x_N(t)) = h$$

where

$$(3) \quad V(x) = V(x_1, \dots, x_N) \simeq - \sum_{1 \leq i \neq j \leq N} \frac{m_i m_j}{|x_i - x_j|^\alpha}, \quad 0 < \alpha < 2,$$

and V is even in x , i.e. $V(-x) = V(x)$.

Equation (1) describes the motion of N bodies of positions $x_i \in \mathbb{R}^k$ and masses $m_i > 0$ under the action of a potential of Keplerian type. The main

¹This work was supported by the M.U.R.S.T.