

MINIMAL ENERGY CONFIGURATIONS OF GRAVITATIONALLY INTERACTING RIGID BODIES

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ABSTRACT. Consider a collection of n rigid, massive bodies interacting according to their mutual gravitational attraction. A *relative equilibrium* motion is one where the entire configuration rotates rigidly and uniformly about a fixed axis in \mathbb{R}^3 . Such a motion is possible only for special positions and orientations of the bodies. A *minimal energy* motion is one which has the minimum possible energy in its fixed angular momentum level. While every minimal energy motion is a relative equilibrium motion, the main result here is that a relative equilibrium motion of $n \geq 3$ disjoint rigid bodies is never an energy minimizer. This generalizes a known result about point masses to the case of rigid bodies.