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SYMBOLIC DYNAMICS OF THE ELLIPTIC RECTILINEAR RESTRICTED 3–BODY PROBLEM

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ABSTRACT. We apply symbolic dynamics to continue our previous study of a symmetric collinear restricted 3–body problem, where the equal mass primaries perform elliptic collisions, while a third massless body moves in the line between the primaries. Based on properties of the homothetic orbit, which is a transversal heteroclinic orbit beginning and ending in triple collision hyperbolic equilibria and using a global Poincaré section, we describe the possible itineraries of binary collisions an orbit can have.

1. Introduction. Since full 3-body problems in celestial mechanics have a great complexity, diverse restricted 3-body models have been considered, as limiting cases when one of the masses tends to zero. The instances first considered were the circular planar restricted 3-body problem [12], and then the Sitnikov problem [9]. Here the massive bodies or primaries perform periodic motions about each other (either circular or elliptical, respectively). Meanwhile, there is a motion of the infinitesimal body in the same plane or in the perpendicular straight line through the center of mass, respectively. The first model has been generalized to cases where the massive bodies perform elliptic motions and the infinitesimal body moves in the same plane or in space. The Sitnikov problem, where the primaries have equal masses has been generalized in [7, 8, 11, 1, 2, 3, 6] where the primaries are no longer in circular or elliptical orbits, but perform parabolic or hyperbolic motions in the plane or they are in constrained to a straight line.

This paper is a sequel to [6], and we undertake here the symbolic dynamics analysis of the problem studied there. In that paper two of the authors started the dynamical study of a symmetric collinear restricted 3–body problem whose equal mass primaries perform elliptic collisions, while a third massless body moves in the

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