Three-Dimensional Version of Hill's Problem with Variable Mass[1]

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The purpose of the present paper is to investigate the motion's properties of an infinitesimal body in three-dimensional version of Hill's problem where the mass of the infinitesimal body is supposed to vary with time. As commonly done, the infinitesimal body is assumed to move under the influence of the other massive and oblate bodies that also have radiation effects. We suppose that the whole system is subject to a perturbation on Coriolis and on centrifugal forces. By using the various transformations, we extract the equations of motion and Jacobi quasi-integral. The properties like the locations of equilibrium points, regions of motion, surfaces with projection, trajectories allocation and the basins of attraction are investigated for various values of mass parameters. The stability is examined by using Meshcherskii space-time inverse transformations.

Keywords: Hill's problem, Variable mass, Jacobi quasi-integral, equilibrium points, stability, Basins of attraction.