

In the present work, the dynamics of a rotating mass dipole system consisting of two masses connected by a massless rigid rod within the framework of the circular restricted three-body problem (CRTBP) is analyzed. We consider that the two primaries have equal masses, equal non-sphericity (oblate/prolate shapes) and equal values of radiation pressure forces that have either extremely strong radiation emission which surpasses the gravitational force or very weak which simply reduces the effect of gravitation. The number, locations, and stability of out-of-plane equilibrium points, as well as structure of zero-velocity curves (ZVCs) under the influence of the perturbations of radiation pressure, force ratio and non-sphericity of the primaries are examined, using numerical methods. It is found that, these out-of-plane equilibrium points emerge in symmetrical pairs and, depending on the sign and magnitude of the perturbing parameters, their number may be either zero, two ($E_{1(2)}^z$) along the Oz axis, four ($E_{3(4)}^{xz}$ and $E_{5(6)}^{xz}$) on the Oxz plane (outside the axes) or six ($E_{1(2)}^z$, $E_{3(4)}^{xz}$ and $E_{5(6)}^{xz}$) on the Oxz plane. We observe that the out-of-plane equilibria in symmetric positions with respect to both axes Ox and Oz are the most sensitive in position to the variations of perturbing forces. Our results also reveal that the perturbing parameters have impact on the structure of the zero-velocity curves. Furthermore, the stability of these points is examined in the linear sense and it is found that all equilibrium points are unstable in general.