

# Liberation Points of a System of Two Cable-connected Artificial Satellites under Different Perturbations with Time Dependent Constraints in Elliptical Orbit

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## ABSTRACT

Liberation points of a cable connected satellites system under the influence of radiation pressure, earth shadow, earth oblateness, geo-magnetic field and air drag in orbit is investigated. The cable is non-conducting, inelastic, light and flexible in nature. We derive differential equations of motion of the system in orbit having value of eccentricity less than one. It is impossible to obtain general solutions of the equations. We also observed that general solutions are insignificant for our problem. Deducing Jacobian integral for the system concerned liberation points are found out. The Jacobean integral has been described as the potential energy of the system of two cable-connected satellites. The integral is very useful to obtain the condition of constraint of the concerned system of the present study. In reality, the present problem of research is a physical and mathematical idealization of real space system. We do not apply the application of numerical simulations technique to the equations of motion of the system concerned. For the present problem, we apply analytical simulations techniques. The influence of the above-mentioned perturbations has been studied singly and by a combination of any two or three or four of the them by various workers but never conjointly all at a time. Therefore, their works could not give a real picture of motion of the system. The influence of wobbling and nutation of the orbit is not taken into the consideration.

**Keywords:** Two satellites system; Inelastic cable; Elliptical orbit; Liberation points.



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