FAR FUTURE (D4)
Space Elevators and Tethers (2)

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INDEPENDENT DYNAMICS AND STABILITY OF TWIN TETHERED OBJECTS

Abstract

The controversial problem of the efficiency of tethered twin masses for soft landing is investigated through an inverse dynamics method. The deployment phase is detailed, with emphasize on the specific dynamics of very long cables and consequences upon the stability of motion of twin thered objects in orbit. Anchoring of the lower end of the space elevator cable is also analyzed and re-entry dynamics and necessary initial conditions for a secure soft landing are discussed. The physical method is considered for central bodies without atmosphere (Moon and other similar satellites of the planets) and for planets with atmosphere. The efficiency of the system is compared with the gasdynamical or ballute soft landing solutions, in terms of mass expense. The technology for the cable deployment is considered as given at any desired size within a circular orbit for a twin tether system of unequal masses. Numerical simulations cover the descent trajectory of the landing mass and the post-landing evolution of the orbital mass after de-connection. Emphasize is put on dynamic loads within the cable during the eigen-descent phase and at the landing position regarding safe anchoring capabilities. The estimates are based on simplifying assumptions regarding the inertial behavior of the hyper-long cable.