

Abstract

In deploying tethered satellite systems (TSS) from orbiting bodies such as the space shuttle, several problems are normally encountered. The most important problem is the oscillations during deployment, station keeping and restoring. A technique for the reduction of sub-satellite oscillations in TSS is introduced here. Conditional reeling/ unreeling of the tether within each cycle is proposed. Pendulum-like models are used with external excitation. This technique is a single parameter control scheme. Its effectiveness is demonstrated in fully nonlinear two and three-dimensional computer simulations. The TSS models for several cases were simulated on a digital computer using the Runge-Kutta method. The simulated cases are: (1) conditional reeling/unreeling within the oscillation cycle of the tether through the deployment process, (2) Conditional reeling/unreeling within the oscillation cycle of the tether through the restoring process, and (3) The conditional reeling/unreeling within the oscillation cycle of the tether through the station-keeping process.