STABILIZATION OF AN INJECTED CONDUCTING LAYER FOR ARTIFICIALLY ENHANCING DRAG ON ORBITAL DEBRIS

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Recently it has been proposed to release in orbit a layer of tungsten dust to enhance artificially the drag on orbital debris. The evolution of a such a tungsten layer suspended in magnetic and gravitational fields is examined. We examine how the the linear stability properties of such a layer are modified by the imposition of a shear flow. of the magnetized suspended layer are examined. A fully compressible, three-dimensional analysis of the layer finds that it is unstable over a physically relevant range of parameters. However, the growth rates of these unstable modes is decreased as the magnitude of the shear flow increases. The variations in stability are shown to be linked to the morphology of the perturbations. Further data is presented on the influence of the streamwise and spanwise wavenumbers, and also the Alfvén, Mach and Froude numbers. The relevant equations are derived and solved by the MagnetoHydroDynamic SPEctral Compressible Linear Stability (MHDSPECLS) algorithm, a Chebyshev collocation code [R. B. Dahlburg and G. Einaudi, *Phys. Plasmas* **7**, 1356 (2000)]. The code allows for the computation of magnetic and thermal effects. The results of this study imply the possibility of maintaining a dusty plasma layer steady in the inertial frame long enough to artificially enhance drag on orbital debris to force rapid reentry.