Paper ID: 66590
student

19th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Post Mission Disposal and Space Debris Removal 2 - SEM (6)

Author: Ms. Janhavi Gore
SRM Institute of Science and Technology, India

# AERODYNAMIC ANALYSIS AND TRAJECTORY DESIGN OF DRAG IMPELLING MODULE (DIM) FOR SRMDEORBITER

**Abstract**

The growth of the space industry has been unrestrained since the advent of small satellites in the discipline. However, alongside various advantages, the novelties in technology and the rise in population of these small satellites also strings along a complexity with respect to the safe usage of space. Considering the expanse of the ever increasing debris in the indispensable segments of the LEO, the obligation for small satellite missions to associate methods for debris mitigation becomes non-negotiable keeping in mind the sustainability of future missions. The implementation of the 25-year rule for the moderation of the generated debris has been acting as an incentive for various methodologies for de-orbiting solutions which include inculcating dedicated active or passive propulsive system devices for end-of-life disposal which influences the mission design to a large extent considering weight and volume occupancy. Theoretical as well as experimental research is being conducted on the usage of drag inducing devices for passive de-orbiting of satellites. Although, the solution comes with its own mechanical and structural complexities. SRMDeorbiter is a university-class nanosatellite mission, currently in the design phase, venturing into the demonstration of a potential optimum deorbiting solution. The inclusion of modularity in the passive Drag Impelling Module (DIM) brings standardization which results in independence of the end-of-life disposal phase from the actual mission design. The device is a three faced equipment capable of fulfilling its power and computational needs for the deployment with negligible requirements from the primary mission. It is intended to provide an optimum momentum loss for atmospheric burn-up by using improvised structural design to support pre-existing drag sails which will provide extra assertion to the fulfillment of the mission objective with lesser mass utility. The proposed paper gives an analytical solution using computer simulations of the flow over the structure in a rarefied atmosphere for understanding the drag profile in order to have a deterministic perspective for simulating the burn-up trajectory along with the thermal simulations to understand the most optimal de-orbit strategy.