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STUDY OF DRAG CHARACTERISTICS OF A PARACHUTE FOR LANDING ON PLANETS AND MOONS WITH DIFFERENT ATMOSPHERIC CONDITIONS AND ITS OPTIMIZATION USING GASES WITH VARYING PROPERTIES

Abstract

With the dawn of spaceflight, we find many worlds in our solar system presenting very distinct possibilities of harbouring life. These are Venus, Mars, Titan, alongside Earth and maybe many more. With each world having very distinct atmospheric characteristics, the performance of a parachute varies significantly, based on the atmospheric density of each planet. In this paper, a computational study on the effect of increased density at the inlet of a parachute on descent velocity and drag force in a steady environment is presented using CFD analysis tools. Drag equations and payload mass values are used for this study. The same has also been plotted using MATLAB. Due to the varying atmospheric properties of different planets, parachute sizing requirements become impractically large in some worlds. Hence, a mechanism to release gases with properties other than those of the gases in these atmospheres is discussed. This helps analyze if the mechanism will aid in sizing down the parachute systems and making them more effective. This paper follows up on a similar study conducted on the atmosphere of Mars and could find widespread application in future missions to these worlds, as research on the viability of life in these planets is becoming increasingly popular.