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BIO-INSPIRED EXPLORATORY MISSION TO STUDY VENUS'S ENVIRONMENT

Abstract

Our closest neighbor and brightest star-like object in the night sky, no other than the planet Venus is named after the Roman goddess of love and beauty. It is also referred to as the morning and evening star as it rises and sets each day. Apart from Uranus, Venus is the only planet in our Solar system that has retrograde orbit. Astronomers believe that a celestial body may have collided with Venus, thus, knocking it off from its upright position. Venus is the second closest planet to the Sun but it is hotter than the mercury itself making it the hottest planet in the solar system. The planet's atmosphere is comprised of carbon dioxide and thick clouds made up of sulphuric acid that is referred to as the runaway greenhouse effect. Because of such a dense atmosphere, the pressure at the Venus surface is 90 times that of Earth's surface or the pressure that is observed at one kilometer of depth at Earth's surface; making it difficult for aerial and robotic vehicles to explore the planets from inside. Climate models indicate that Venus once had liquid water before it suffered a runaway greenhouse effect that left it in the hot and hellish situation as it is today. In addition to this, it has been recently discovered that there is a possibility of microbial life in the Venus cloud tops that puts our mind to unrest as it requires serious attention. This paper proposes a bio-inspired, passive re-entry vehicle mission to study the planet's atmosphere. A comprehensive idea in terms of the lifting conditions, airfoil, and its aerodynamics would be given to discuss its functionality in such a hostile aerodynamic condition. Trade study for the airfoil selection and orbital design against delta-V requirements have been carried out to argue for the possibility of such an exploratory mission. Comprehensive tables and graphs will be provided, which will depict the amount of time that will pass at each mode of travel for such an interplanetary mission.