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Author: Mr. Rohan Chandra
University of Petroleum and Energy Studies, India, rohanchandra2316@gmail.com

Mr. Monish Mathur
University of Petroleum and Energy Studies, India, monishmathur26@gmail.com
Mr. Mridul Sengupta
University of Petroleum and Energy Studies, India, sengupta.mridul4@gmail.com
Mr. Shaun Andrews
University of Bristol, United Kingdom, sa15339@my.bristol.ac.uk

STRUCTURAL DESIGN AND ANALYSIS OF AN AEROSHELL FOR A HUMAN CREW RE-ENTRY VEHICLE

Abstract

A re-entry vehicle undergoes a speed envelope of hypersonic speed, at which the stresses, pressure and heat on the external skin of the capsule is very high. The structural mass estimation techniques and curve fitting technologies are difficult to be applied to new spacecraft and for the future human space missions. This technical paper proposes a computerized modelling and designing of an aeroshell structure for a human-crew exploration vehicle. Numerous design frameworks have been studied under stiffened cone subject to buckling under entry aerodynamic pressure. The aeroshell structure is designed and analyzed under uniform pressure to buckling failure. The structural model is then employed to simulate a number of critical loading events associated with high speed reentry to assess structural integrity and define aeroshell interface environments.