

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures I - Development and Verification (Space Vehicles and Components) (1)

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A STUDY ON THE DESIGN AND STRUCTURAL ANALYSIS OF FILAMENT WOUND COMPOSITE
MOTOR CASE WITH INTER METALLIC SEGMENT JOINT

Abstract

Solid Rocket Motor is being used in the ISRO's launch vehicle such as PSLV, GSLV, LVM3, RLV and HSP. Material used is 15DV6 steel for ≈ 1 m dia. motors and M250 material for the remaining Motors. Metallic segment are made with conventional rolling and welding technique. Tang and clevis joints are used for connecting this metallic cylindrical and end segments. Other nations mostly using Flow forming route with the D6AC material. Composite filament wound cases (FWC), successfully employed in applications as a monolithic case for more than four decades in solid rocket motor (SRM) design. This enables increased operational pressure and increased payload capabilities. Consequently, new and present launch vehicles are considering migrating towards high specific strength high specific stiffness monolithic FWC for shorter length (≈ 15 m) motors and segmented FWC for larger length (≈ 15 m) solid Rocket Motors considering the easiness in casting and handling. Considering the world scenario, ISRO also initiated to study the feasibility of developing the segment joint for connecting the composite cylindrical shells. Design was carried out based on the strength and stiffness approach. This report covers the details of the design and 3-D finite element analysis results of composite segment joint and payload gain due to decrease of the inert mass.