

MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
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A COMPARATIVE ASSESSMENT OF CRITICALITY OF LOCAL DAMAGE IN COMPOSITE LINER  
OF A NOZZLE THROUGH FINITE ELEMENT THERMAL-STRUCTURAL ANALYSIS

**Abstract**

This paper presents the analysis methodology for assessing a local damage observed in the composite liner of a conical nozzle divergent sub assembly of a Solid Booster. The damage was observed during regular inspection after the final processing of the sub assembly for a flight mission. The extent and nature of damage was assessed through visual and ultrasonic inspections. The damaged region was found to have intermittent cracks and the affected area was approximated to a rectangular slot. The thermal and structural loads experienced by the nozzle during the flight were carefully studied and three different time instances were identified for thorough analysis. Detailed finite element analyses were carried out for generic and defect cases. The stresses in the composite liner were compared. The dependence of the coefficient of thermal expansion of the composite material on the heating rate employed in testing was also investigated through experiments. An engineering approach encompassing these details is presented in this paper for the assessment of such deviations.