FINITE ELEMENT ANALYSIS OF FLEX SEAL OF SOLID ROCKET MOTOR

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Abstract

Flex nozzle system is used to change the direction of space vehicles such as Rockets, Missiles and Satellite launch vehicles. The flex seal joint is particularly useful for coupling structural members which are required to be moved relative to each other in an omnidirectional manner and other parts provide required structural strength to with stand mechanical and thermal loads acting on the system. Design and analysis of flex seal involves stability and strength check in flex seal sub assembly parts due to external design pressure load. In this case, all the components are metallic and loads and constraints are axi-symmetric and hence a 2-D axi-symmetrical analysis is performed. Due to non-linear behaviour of rubber pads used in flex seal sub assembly, a non-linear static analysis is performed in the above case. The effect of material, thickness of elastomeric pads, and the effect of number of shims are considered in this analysis. For stable cases the study is extended to failure analysis. From the present analysis, a nozzle system with 5 number of steel shims and elastomeric pad thickness of 5mm is found to be safe in stability as well as strength point of view.