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DAMAGE MITIGATING ANALYSIS FOR LIQUID ROCKET ENGINE OF NEXT REUSABLE  
LAUNCH VEHICLE

**Abstract**

With the increasing demand for space transportation, the development of reusable engine technology has received extensive attention. High performance LOX/Kerosene has been developed in China, and the advanced research about LOX/Kerosene gas generator engine has also been studied for the future demand of reusable launch vehicle (RLV). One of the key technologies for reusable engine is damage-mitigating analysis. The engine works in an extremely harsh environment. It is needed to carry out damage-mitigating research and deeply analyze the failure mode of the components. The purpose of the damage-mitigating analysis is to solve the events of structure cumulative damage and the structural life impacted by parameters. For reusable engine, the main failure mode includes thermal fatigue of chamber, vibration fatigue of structure, friction and wear, as well as components creep, aging, etc. In present paper, the thermal shock fatigue of chamber is studied in detail. Thermal shock fatigue is one of the main damage modes in LRE which uses regenerative cooling system. Thermal shock means the high-level thermal stresses generated as a result of significant temperature gradients which occur during engine start-up, shut-down and thermal transient conditions. Simulation results are presented in this paper.