Paper ID: 13537
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SPACE PROPULSION SYMPOSIUM (C4)
Propulsion System (1) (1)

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DEMONSTRATION OF A 600KN CLASS LOX/METHANE ROCKET ENGINE

Abstract

Liquid oxygen (LOX)/liquid methane (LCH4) propellants combination is considered as a leading candidate propulsion technology for the future space vehicles. A 600kN class LOX/LCH4 gas generator cycle prototype engine has been developed in China since 2006 to develop rocket engine reusability technology. A LOX/methane thrust chamber, with a shear coaxial injector and a methane regenerative-cooled chamber, was developed for the engine. A number of experiments at subscale level were conducted to study and evaluate methane/LOX gas-liquid and liquid-liquid injection combustion performance, combustion instability and methane cooling characteristics etc. A methane/oxygen turbine pump together with a LOX/methane gas generator was hot tested to validate their thermo-mechanical behavior. Thirty six hot runs were performed totally more than 538 seconds of hot testing time for the LOX/methane components and subsystem. Prototype engine at full power levels have been achieved successfully accumulating 4 tests and 67 seconds of operation. The engine showed excellent reliable steady state and transient behavior and high level performance. LOX/methane engine offers some advantages for future space transprotaion.