

SPACE PROPULSION SYMPOSIUM (C4)

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DEVELOPMENT OF A 35KN THRUST HYDROGEN PEROXIDE/KEROSENE
STAGE-COMBUSTION ENGINE**Abstract**

The Advanced Upper Stage is an upper stage series combining with the future launch vehicles or reusable launchers and meeting the development of China's future space transportation system. It will conform to the non-toxic, pollution-free, safe, reliable and low-cost requirements. Hydrogen peroxide/kerosene engine is most applicable to the Advanced Upper Stage. Beijing Aerospace Propulsion Institute designed, built and tested a 35kN thrust hydrogen peroxide/kerosene stage-combustion engine for the Advanced Upper Stage. Benefits of our engine selection are: 1)improved safety by minimizing toxicity and environments impact; 2)excellent on-orbit propellant storability; 3)performance potential near traditional earth storable propellant engine; 4)high density specific impulse, minimum vehicle size, inert weight and cost; 5)common propellant with mono-propellant RCS. Major engine design elements include catalyst bed, gas-liquid injector, regenerative-cooling chamber and turbopump assembly. The development of the engine has successfully completed a series of key component, assembly, subsystem and system testing. During the development of the engine, the key technologies including stage-combustion engine system, catalyst bed, high-performance combustion, regenerative-cooling chamber and turbopump assembly were solved. An overview of the engine development program was described. The paper discussed major design requirements, engine configuration, assembly design features and the results of engine test. The hot-fire test result showed that the technical parameters of the engine conform to the requirements of the Advanced Upper Stage and the vacuum specific impulse is over 303s.