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吴靖, 张国舟, 蔡国飙. 真空应用电火花点火的氢氧发动机设计与试验[J]. 航空动力学报, 2014, 29(2): 398~404

真空应用电火花点火的氢氧发动机设计与试验

Design and experiment of gaseous hydrogen/oxygen engine igniting with electric spark igniting in vacuum

投稿时间: 2012-12-13

DOI: 10.13224/j.cnki.jasp.2014.02.020

中文关键词: [氢氧](#) [缩比发动机](#) [真空](#) [电火花点火](#) [球头密封声速喷嘴](#)

英文关键词: [hydrogen/oxygen](#) [shrink ratio engine](#) [vacuum](#) [electric spark igniting](#) [sonic nozzle with ball-end seal](#)

基金项目:

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中文摘要:

为研究某大推力氢氧发动机真空羽流效应, 设计采用火炬点火方式的60N缩比氢氧发动机. 通过球头密封声速喷嘴组件控制流量, 使真空下每个声速喷嘴组件减少3个密封面. 进行真空点火方案设计, 从理论上证明电火花点火的可行性. 设计试验系统并进行地面及真空环境下的热试车, 试车结果表明: 燃烧室压力达到额定压力为0.6MPa时, 发动机热防护结构良好, 试验系统设计合理, 真空电火花点火方案可行, 为进行真空羽流效应研究奠定基础.

英文摘要:

In order to investigate the vacuum plume effects of a large-thrust hydrogen/oxygen engine, a shrink ratio gaseous hydrogen/oxygen engine of 60N-thrust with torch igniting method was designed. The mass flow rate was controlled by a sonic nozzle with ball-end seal, such that 3 sealing faces were reduced in every assembly compared to the traditional one. The vacuum igniting scheme was designed, and the feasibility of igniting with electric spark was confirmed in theory. The experiment system was devised and the heat test run was conducted in both ground and vacuum conditions. The results show that when the chamber pressure reaches nominal 0.6MPa, the thermal protective structure of the engine works well, the experiment system is reasonable, and the scheme of igniting with electric spark in vacuum is feasible, laying a solid foundation for the vacuum plume effect investigation.

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