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Author: Dr. yuntao zheng
Science and Technology on Scramjet Laboratory, Beijing Power Machinery Research Institute, China, yb230207@163.com

Dr. Baoxi Wei
Science and Technology on Scramjet Laboratory, Beijing Power Machinery Research Institute, China, weibaohuasky@163.com
Mr. Zhuang Ning
Science and Technology on Scramjet Laboratory, Beijing Power Machinery Research Institute, China, nz0806@163.com
Dr. Qiang Gang
Science and Technology on Scramjet Laboratory, Beijing Power Machinery Research Institute, China, 48251836@qq.com

MULTI-OBJECTIVE OPTIMIZATION DESIGN OF RBCC EJECTOR MODE PERFORMANCE

Abstract

Multi-objective optimization design of a Rocket Based Combined CycleRBCC engine ejector mode was performed in the present paper. The two conflicting performance parameters, specific impulse and thrust to area ratio, were considered as the optimization objectives. And the design parameters of the RBCC engine were bounded including ejector geometry, primary rocket nozzle expansion ratio, primary rocket chamber pressure, primary rocket chamber mixture ratio and the secondary fuel injection. In the rocket-ejector performance simulation, the thermodynamic properties of mixture were found by using the calculated primary and secondary mass flow rates while different specific heat ratio and gas constant were considered. Based on the foregoing simulation, a quick and efficient optimization procedure was established by hybrid optimizstion algorithm and discrete variables setting. Considering a gas-oxygen\kerosene rocket-ejector, the rationships between the engine performance parameters and the design parameters were analyzed and discussed, that were compared with measured values in experiment. Thus the pareto front for specific impulse and thrust to area ratio was obtained.