

SPACE PROPULSION SYMPOSIUM (C4)
Hypersonic and Combined Cycle Propulsion (5)

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THE MULTI-OBJECTIVE OPTIMIZATION DESIGN FOR TWO-DIMENSIONAL VARIABLE
SCRAMJET ENGINE COWL**Abstract**

Abstract: Most time, scramjet engine needs to work in its non-designed condition, making it cannot be at its best working state. Considering this, a multi-objective optimization design for two-dimensional variable scramjet cowl, which can moves forward/backward and up/down, was done here. Total pressure recovery coefficient, static pressure rise and drag coefficient were selected as performance objective functions to form the multi-objective optimization problem of the two-dimensional scramjet mixed compression inlet with 3 external compression ramps and 2 internal compression ramps. Based on one-dimensional aerodynamics analysis method, and to avoid converging to local optimal solutions and using gradient information which was hard to reach for numerical simulation, a multi-objective hybrid genetic algorithm was employed to find optimal solutions for different flight environment. It confirmed that according to different time-alterable flight environment, the scramjet engine can always work at its best state by adjusting variable cowl to the optimal location, making aircraft finish its missions quicker and more economical. In a word, variable scramjet engine cowl is a rather innovational concept and will be very useful in the future.