

SPACE PROPULSION SYMPOSIUM (C4)
Hypersonic and Combined Cycle Propulsion (9)

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MULTI-POINTS INTEGRATED AIRFRAME/ENGINE CONFIGURATION OPTIMIZATION OF
HYPERSONIC VEHICLE**Abstract**

Integration design and optimization of airframe/engine is a remarkable characteristic for hypersonic vehicle. Furthermore, engine is required to work efficiently through a wide envelop of Mach numbers (Ma) usually. As a result, conventional single-point based design method will be not proper for airframe/engine design and new design methods are needed badly. Aiming at solving this problem, the paper focuses on an integrated airframe/engine configuration design and optimization, using a multi-point design method. Based on this methodology, an optimal integrated airframe/engine configuration, which works well over a range of flight conditions, can be searched. Chosen coefficients of thrust, lift and moment as objective functions, a three-point optimization was done and an optimal integrated airframe/engine configuration was found, based on Design of Experiment (DOE) and surrogate model. Then, performances of the optimal configuration were computed in a wide envelop of Mas and angles of attack (AOAs). Comparing performances of the optimal configuration with a baseline one optimized on a single-point, it's found that optimal integrated airframe/engine configuration has a better performances through a wide flight envelop than the baseline one. It confirmed the effectiveness and superiority of multi-points optimization method used in integrated airframe/engine configuration design.