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### 翼型外形高气动效率/低可探测性的优化

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### AIRFOIL SHAPE OPTIMIZATION FOR HIGH AERODYNAMIC EFFICIENCY/LOW OBSERVABILITY

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摘要

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**摘要** 采用 van Leer 矢量通量分裂格式求解 Euler 方程的方法计算了绕翼型的气动特性; 采用矢量通量分裂方法计算了绕翼型的时域电磁散射特性及雷达散射截面积 (RCS); 采用一种简单而有效的数值优化方法对流场解和电磁场解进行了翼型外形高气动效率/低可探测性的优化计算。算例结果表明, 本方法提供了一种对翼型既可作气动优化设计亦可进行多学科综合设计的有效工具。

**关键词:** 数值优化 Euler 方程 Maxwell 方程 气动/隐形综合设计

**Abstract:** van Leer's splitting scheme is used to solve the Euler equations to obtain the aerodynamic characteristics. The vector flux splitting scheme is used to calculate the time domain electromagnetic scattered characteristics. Radar cross section (RCS) is then evaluated with the equivalence principle and Fast Fourier Transformation. Two obtained solutions are coupled with a simple effective numerical optimization algorithm to obtain high aerodynamic efficiency and low observability of the airfoil. Numerical results show that the present method is an effective and robust tool for designing or revising airfoils, as well as for multi disciplinary optimization.

**Keywords:** numerical optimization Euler equations of motion Maxwell equation multi-disciplinary optimization

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