



短舱扰流片对运输机增升装置气动特性的影响

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Nacelle Strake's Aerodynamic Characteristics Effects on High-lift Configuration of Transport Aircraft

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摘要

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摘要

以民用运输机增升装置复杂增升构型气动设计为背景,针对短舱扰流片对增升构型气动性能的影响,借助数值模拟对流动控制效果和影响机理进行研究。数值结果表明:合理的扰流片设计可以明显改善增升装置的气动特性,提高最大升力系数0.3以上,增大失速迎角 3° 左右。短舱扰流片安装参数研究表明:短舱扰流片产生旋涡强度对其推迟失速的效果有明显影响;在所研究的范围内,短舱扰流片弦向位置明显影响扰流片的当地来流迎角,进而改变所产生旋涡的强度;扰流片的周向安装角主要影响扰流片的来流强度,同样影响所产生旋涡的强度;扰流片面积对提高升力系数贡献不大,主要影响失速形态。

关键词: 运输机 增升装置 短舱扰流片 气动特性 机理 安装参数

Abstract:

The present paper focuses on the mechanism investigation and parametric analysis of the nacelle strake mounted on the high-lift configuration of civil transport aircraft. Numerical simulation is carried out for this research. Results show that appropriate design of strake could greatly improve the aerodynamics performance of the high-lift configuration. The maximum lift coefficient can be increased by least 0.3 and the angle of attack can be increased by 3° . Through parametric analysis of the nacelle strake, it's found that the strength of the vortex generated by the strake is a key factor of its stall delay effect. In the research, influences of the installation parameters of the inboard strake are that through affecting the strake's local angle of attack, the axial location of the strake controls the strength of the vortex; the circumferential angle affects the strake's incoming flow speed, and then controls the strength of strake's wake; the area of the strake nearly has no effect on lift coefficient of high-lift configuration, it mainly affects the stall behaviors of the high-lift configuration.

Keywords: transport aircraft high-lift configuration nacelle strake aerodynamic characteristics mechanisms installation parameter

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