

论文

晴空飞机尾流的雷达探测性能分析

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摘要

该文分析了晴空飞机尾流RCS(雷达截面积)的频域特性和时变特性, 导出了相参多普勒雷达探测飞机尾流的LMP(局部最大势)检测器及其检测概率、虚警概率的解析表达式, 在此基础上导出了尾流探测的雷达方程。仿真分析结果表明: 垂直入射的尾流探测性能一般优于斜入射探测; 当雷达观测时间较长时, 斜入射探测性能随雷达距离分辨单元的增大而改善; 对于单位长度RCS为 $-80 \sim -60$ dBm²/m的飞机尾流, 其雷达探测距离可达30~100 km。

关键词 [雷达](#) [飞机尾流](#) [相参探测](#) [雷达方程](#) [局部最大势](#)

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Radar Detection Performance of Aircraft Wake Vortices in Clear Air

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Abstract

In this paper, the frequency domain characteristic and time-varying characteristic of the RCS (Radar Cross Section) of aircraft wake vortices in clear air are analyzed. A LMP (Locally Most Powerful) detector is introduced for detection of aircraft wake vortices using coherent Doppler radar, and the analytical expressions of detection probability and false alarm probability are derived for the detector. Then the radar equations are deduced for radar detection of wake vortices. Simulation results indicate that, the detection performance of normal incidence is better than that of oblique incidence. The detection performance is improved with increasing radar range resolution, on condition that the radar observation time is long. For a wake vortex who's RCS per unit length is between -80 dBm²/m and -60 dBm²/m, the radar detection range can be between 30 km and 100 km.

Key words [Radar](#) [Aircraft wake vortex](#) [Coherent detection](#) [Radar equation](#) [Locally most powerful](#)

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