

论文

基于几何光学的红外成像模型

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摘要:

提出一种基于光线追击法的CFD湍流场的红外成像模型, 用“数字图像”模拟“真实目标”进行仿真计算。通过对比原始图与仿真结果, 得出超高速导弹附面层可引起降晰效应的结论, 为弹载计算机的图像复原算法提供了理论依据。按照导引头的工作原理, 把模型分为远距离、临界距离和近距离3种类型分别讨论, 最后分析了点扩散函数与数字图像处理中降晰模板之间的关系。

关键词: 红外导航系统 气动光学 光线追迹 点扩散函数 降晰模板 CFD网格

Infrared imaging model based on geometrical optics

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Abstract:

An infrared-imaging model for a CFD turbulence flow field was established with light ray tracing. It uses a “digital picture” to simulate an “actual target” to carry out simulation and calculation. It is concluded that there are blur effects of the wall-attached layer on a hypersonic missile by comparing the original picture with the simulated picture. It provides the missile computer the theoretical support for recovering images. This paper categorized the models into three types, long-distance, critical-distance and short-distance, according to the operation concept of infrared seeker. All these models were discussed respectively. The relationship between the PSF and the blur board used in digital image processing was analyzed.

Keywords: infrared-guidance system aero-optics ray tracing point spread function blur board CFD grids

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