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用于飞行仿真的二维紊流场的数字生成法

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DIGITAL GENERATION OF TWO-DIMENSIONAL FIELD OF TURBULENCE FOR FLIGHT SIMULATION

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摘要 在飞行仿真的某些特殊情况(例如编队飞行、空中加油情况)下有必要生成二维紊流场,其中的紊流速度是两个坐标(例如沿飞行方向的x和沿翼展方向的y)的随机函数。在已有的一维紊流场生成技术的基础上,本文提出了一种简易而有效的生成二维紊流场,即在矩形网络上生成紊流速度序列的方法。经抽样检验,这样生成的紊流场的相关函数基本上符合紊流模型的相关特性,因而证实了该方法的可行性。还讨论了在飞行仿真中二维紊流生成器的两种运行方式——在线式和离线式。

关键词：

Abstract： In some special cases of flight simulation (e. g. for formation flight, in-flight tanking) it is required to generate two-dimensional field of turbulence, in which the turbulent wind speeds are stochastic functions of two coordinates (e. g. x in the flight direction and y in the wing span direction). For this purpose a simple and efficient technique for digital generation of two-dimensional field of turbulence, i.e. for production of turbulent speed sequences on a rectangular network, is proposed in this paper. The correlation of so generated turbulent field is found to be in good agreement with the theoretical correlation of the Dryden model, thus the feasibility of the proposed method is verified. Two possible operation modes (off-line and on-line) of the turbulence generator in flight simulation are also discussed.

Keywords：

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