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后掠激波边界层干扰中Mach数对特性区影响的研究

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MACH NUMBER EFFECTS ON UPSTREAM INFLUENCE IN SWEPT SHOCK WAVE/TURBULENT BOUNDARY LAYER INTERACTIONS

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摘要 本文介绍了由后掠压缩角模型引起的激波和湍流边界层干扰的实验研究。实验雷诺数Re=2.42～2.47×10~7/m,Ma_∞=1.79,2.04和2.50。模型共15个,其后掠角变化范围是0°～60°,流向压缩角变化范围为10°～30°。实验结果表明,在本实验范围内,激波边界层干扰中的上游影响区都呈现出柱形区或锥形区特性;柱形区和锥形区之间的边界随来流Mach数减小向锥形区发展。该边界主要决定于无粘激波的形式。

关键词： 激波 湍流边界层 流动显示

Abstract： The paper presents an experimental study of shock wave /turbulent boundary layer interactions by swept compression corners, which was carried out in G-3 supersonic blowdown wind tunnel at BU-AA. 15 models with swept back angle λ and 0°≤λ≤60°, 10°≤λ≤ 30° were tested throughout the study; the parameters used in tests were Re =2.42-2-47 ×107/m , Ma∞ = 1.79, 2.04 and 2.50. The results show that the conical or cylindrical upstream influence region appears, in the interactions for all models and Mach numbers. The boundary between the conical and cylindrical region varies with Ma∞, and can be physically determined by the shape of the inviscid shock wave.

Keywords： shock wave turbulent boundary layer flow visualization

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