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LES/RANS混合方法对超声速底部流动的应用

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LES/RANS hybrid method for supersonic axisymmetric base flow

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摘要　为克服大涡模拟(LES,Large Eddy Simulation)对近壁区域使用的局限,近年来LES/RANS(Reynolds Averaged Navier-Stokes)混合方法成为研究热点,利用LES与RANS两者自身的优点克服对方的不足,有效实现计算精度和效率的统一.基于LES/RANS混和方法,采用Smagorinsky-BL(Baldwin-Lomax)模型和新型Vreman-BL模型,对超音速底部流动这一难题进行了模拟,分析了其流场结构.计算结果表明:得到的速度型、底面压力分布与实验值吻合,优于雷诺平均方法的结果.

关键词：　湍流　大涡模拟　近壁流动　混合方法

Abstract：　To overcome the limitation of large eddy simulation(LES) for wall problem, LES/RANS hybrid method was investigated in recent years,which not only combined the advantages of LES and RANS but also avoided the disadvantages of each other. Base flow is a difficult problem in CFD. Based on LES/RANS hybrid method, Smagorinsky-BL model and a new Vreman-BL model were applied to an axisymmetric base flow at supersonic conditions. The obtained base flow structure was analyzed in comparison with experimental data. The results show that predictions of velocity, pressure distribution, velocity and pressure distributions of base flows using hybrid method compare well with experimental data.

Keywords：　turbulence　large eddy simulation　wall flow　hybrid

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