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瞬时起动圆柱的初期流动

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THE EARLY DEVELOPMENT OF THE FLOW AROUND AN IMPULSIVELY STARTED CIRCULAR CYLINDER

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摘要 本文将ADI方法和Poisson方程直接法结合起来求解涡量-流函数形式的N-S方程,研究瞬时起动圆柱的初期流动 (Re=3000,5000,9500)。成功地算出实验观察到的α流动结构、β流动结构,以及这些结构在流动发展过程中交替出现的情况。本文方法效率 高,计算结果与实验结果及他人的数值计算结果相符较好。可期望用该方法计算其它复杂流动。

关键词： 非定常流　N-S方程　数值计算　圆柱

Abstract： The early development of the flow of an impulsively started circular cylinder through numerically solving the N-S equations in vorticity and stream function form is studied, using ADI method to solve the vorticity equation and a fast Poisson solver to solve the stream function equation(Re= 3000, 5000, 9500). The a- and B-phenomenon observed by experiments in the flow development were successively simulated. The present method is efficient and the calculated results are in good agreement with experimental data and numerical calculations given by other accurate methods.

Keywords： unsteady flow　N-S equation　Numerical calculations　cylinder

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