



偏微分方程及其应用中心

学术报告

报告题目: Prandtl - Batchelor Flows on a Disk

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摘要:

For steady two-dimensional flows with a single eddy (i.e. nested closed streamlines), Prandtl (Über Flüssigkeitsbewegung bei sehr kleiner Reibung. Verhandlungen des III. Internationalen Mathematiker Kongresses, Heidelberg, 1905) and Batchelor (J Fluid Mech 7(1):177-190, 1956) proposed that in the limit of vanishing viscosity the vorticity is constant in an inner region separated from the boundary layer. In this paper, by constructing higher order approximate solutions of the Navier-Stokes equations and establishing the validity of Prandtl boundary layer expansion, we give a rigorous proof of the existence of Prandtl-Batchelor flows on a disk with the wall velocity slightly different from the rigid-rotation. The leading order term of the flow is the constant vorticity solution (i.e. rigid rotation) satisfying the Batchelor-Wood formula.