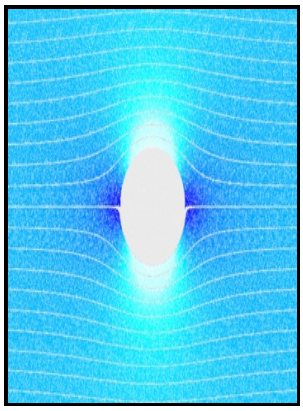
On the steady, two-dimensional flow of a viscous liquid past a fixed circular cylinder.

- - Solved: Consider steady, incompressible, two



Description: -
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Notes: Thesis, Ph.D., 1937.
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Tags: #Two

Effect of aligned magnetic field on the steady viscous flow past a circular cylinder

For low Reynolds number, the well-known singular perturbation analysis for this problem shows that the asymptotic expansions of the drag coefficient and of the flow field start with infinite logarithmic series. In the near field, let us assume that the second-derivative changes in the velocity and pressure fields are of lower order in the axial direction of the slender body than in the transverse plane. Let us assume Oseen flow with the slip boundary condition.

CiteSeerX — Citation Query Expansions at small Reynolds numbers for the flow past a sphere and a circular cylinder,"

The flow parameters such as drag coefficient, length of the recirculation zone, and the angle of separation are presented as functions of the Reynolds number and blockage ratio. The important applications are also highlighted.

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Note that this equation ignores viscous effects along the walls but is a reasonable approximation throughout the majority of the flow field. A slender-body theory is presented.

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. Examples of these results are verified rigorously using the integral representation.

Wall effects in flow past a circular cylinder in a plane channel: a numerical study

It is also found that, contrary to that of the solid cylinder, the recirculating wake develops downstream of or within the porous cylinder, but not from the surface of it. The corresponding variations are depicted in figures. Similarly, for a fixed value of λ, both the angle of separation and the length of the recirculation zone increase with the increasing Reynolds number.

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For k 0 the intuitive understanding of the problem is aided by regarding it as spherically symmetric in k + dimensions. It has been successfully used in a wide variety of applications cf. Also presented in the current study are the variation of the critical Reynolds number for the onset of a recirculating wake as a function of Darcy number and the variation of a newly defined parameter, the penetration depth, as a function of the Reynolds number and Darcy number.

Two

The cylinder cross-section is symmetric about the direction of the oncoming stream, but otherwise is arbitrary.

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