

Hydrodynamic force on a plate near the plane wall. Part I: plate in sliding motion

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Abstract

Three-dimensional slow viscous flow due to the sliding motion of a thin plate with an arbitrary planform parallel to an infinite plane is investigated, when the gap between the plate and the plane is much smaller than the characteristic dimension of the plate. Asymptotic expansions for the viscous force and torque on the plate are obtained by using the method of matched asymptotic expansions. For a circular disk parallel to an infinite plane, the results are in good agreement with those obtained by the dual integral equation approach.

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