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The transition between the Stokes equations and the Reynolds equation: A mathematical proof. (English) Zbl 0701.76039

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Summary: The Reynolds equation is used to calculate the pressure distribution in a thin layer of lubricant film between two surfaces. Using the asymptotic expansion in the Stokes equations, we show the existence of singular perturbation phenomena whenever the two surfaces are in relative motion. We prove that the Reynolds equation is an approximation of the Stokes equations and that the kind of convergence is strongly related with the boundary conditions on the velocity field.

MSC:

76D07 Stokes and related (Oseen, etc.) flows
35Q30 Navier-Stokes equations

Cited in **52** Documents

Keywords:

Reynolds equation; thin layer of lubricant film; Stokes equations

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