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Extended Generalized Reynolds Equation in Fluid Mechanics

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Abstract

In the theory of hydrodynamic lubrication, two dimensional classical theories were first given by Osborne Reynolds. In 1886, in the wake of a classical Beauchamp Tower's experiment given by Reynolds, he formulated an important differential equation, which was known as: Reynolds Equation given by Reynolds in 1886. Later Osborne Reynolds himself derived an improved version of Reynolds Equation known as Generalized Reynolds Equation, which depends on density, viscosity, film thickness, surface and transverse velocities. The concept of rotation was discussed by Banerjee et al. in 1981 that the rotation of the fluid film which lies across the film gives some new results in lubrication problems of fluid mechanics. The equations for motion of first order rotatory theory and second order rotatory are derived, which have given very important and useful results for journal and thrust bearings.

Keywords: Lubrication theory, Reynolds equation, Rotation number.

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