



The Thin Oil Film Equation

By James L Brown, Jonathan W Naughton

Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.A thin film of oil on a surface responds primarily to the wall shear stress generated on that surface by a three-dimensional flow. The oil film is also subject to wall pressure gradients, surface tension effects and gravity. The partial differential equation governing the oil film flow is shown to be related to Burgers equation. Analytical and numerical methods for solving the thin oil film equation are presented. A direct numerical solver is developed where the wall shear stress variation on the surface is known and which solves for the oil film thickness spatial and time variation on the surface. An inverse numerical solver is also developed where the oil film thickness spatial variation over the surface at two discrete times is known and which solves for the wall shear stress variation over the test surface. A One-Time-Level inverse solver is also demonstrated. The inverse numerical solver provides a mathematically rigorous basis for an improved form of a wall shear stress instrument suitable for application to complex three-dimensional flows. To demonstrate the complexity of flows for which these...



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