

70 years of Elastohydrodynamic Lubrication (EHL): A Review on Experimental Techniques for Film Thickness and Pressure Measurement

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Abstract: Elastic deformation of surfaces and piezo-viscous effect of lubricant make EHL a very complex lubrication regime. Elastohydrodynamic Lubrication becomes much more complex when conditions like rough surfaces, non-newtonian behavior of lubricant and temperature dependent flow are considered. The present paper takes the task of reviewing experimental methods applied till date for measuring film thickness and pressure. The paper has been divided into many sections and sub-sections to deal with these techniques in a lucid manner. Experimental methods have been categorized into Electrical, Optical and Acoustic methods. The difference of 8–10% between theoretical and experimental results are witnessed using Electrical methods. Whereas, this difference is less than 1% using Optical methods. Among all optical methods, Relative Optical Interference Intensity Technique is the most effective technique with an ability to measure the film thickness as small as 1 nm or less. The last section of the paper deals with the scope of improvement in measurement techniques in future to understand EHL in more detail.

Keywords: Elastohydrodynamic lubrication; Optical methods; Relative optical interference intensity technique; Electrical methods; Acoustic methods