



Elasto-Hydrodynamic Lubrication, By D. Dowson and G. R. Higginson, International Series in Material, Science and Technology, Vol. 23, Pergamon Press, Oxford, UK, 232 pp., \$12.00 U.S.

REVIEWED BY KLAUS W. NIELSEN¹

The introductory chapter of this text contains in a concise, but unusually well written form, a chronology of theoretical and experimental work, the results of which constitute our major knowledge of this not very tractable subject.

Chapter II.

The Reynolds and energy equations are introduced in a conventional form in a brief presentation of the basic equations of hydrodynamic lubrication.

Chapter III.

A theoretical description is given of the relationships which govern the lubrication of rigid cylinders. Cavitation effects are included in this discussion.

Chapter IV.

The calculation of the film thickness in highly loaded rigid contacts is illustrated by several numerical examples.

Chapter V.

The theory of elasticity is utilized to determine stresses and strains with respect to the contacting solids. This chapter suffers from its brevity.

Chapter VI.

In this chapter there is a discussion of the more successful approaches which have been used towards solving the elasto-hydrodynamic problem. Emphasis is put upon the author's own approach which in turn is based upon Grubin's earlier work.

Chapter VII.

This chapter contains a discussion of theoretical work which is concerned with the relative effect of external variables (such as speed

effects and lubricant compressibility) upon the pressure distribution and film thickness.

Chapter VIII.

Experimental work, including the history of mechanical testing devices as well as more recent film thickness measuring methods, is covered in this chapter. The descriptive text is augmented with copious quantitative information.

Chapter IX.

A detailed description is given of disc type equipment used in film property investigations. Capacitance techniques are discussed as utilized in determining both film thickness and the shape of the gap.

Chapter X.

Rolling and sliding friction are considered with respect to their relationship to lubricant viscosity. A heat balance is discussed as well as the need for an effective viscosity. High and low sliding speeds are treated.

Chapter XI.

A description of theoretical and experimental results is presented. This subject and the book would have benefited from more emphasis upon a commentary interpretation, instead of the rather bland reviewing exposition presented here.

Chapters XII and XIII.

Very brief discourses are presented on the analysis of roller bearing and simple gear lubrication, indicative of the limited extent to which existing knowledge is applicable to design problems.

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The authors are to be congratulated on a concise and generally clear monograph on the state of the art in elasto-hydrodynamic lubrication. The book will serve well as an information source for the nonspecialist or a working practitioner, as it does not demand excessive mathematical competence.

In view of the current trend, the publishers should be commended for the reasonable price of this book.

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