

CONTENTS

	Page
Editor's Foreword	v
Preface to the English-Language Edition	vii
Nomenclature	xiii
Chapter 1	FRICITION OF SOLIDS AND FLUIDS : VISCOUS FLOW
1.1	Dry Friction 3
1.2	Seizure 11
1.3	Rolling Friction 11
1.4	Lubrication – General Considerations 12
1.5	Semidry Friction 14
1.6	Hydrodynamic (Fluid) friction 16
1.7	General Equations on the Hydrodynamics of Viscous Fluids 17
1.8	Equation of Continuity 22
1.9	Equation of State 23
Chapter 2	LUBRICANTS
2.1	Viscosity 24
2.2	Density 31
2.3	Other Characteristics 32
2.4	Consistent Greases 33
2.5	Utilization of Oils and Greases 35
Chapter 3	GENERAL THEORY OF SLIDING BEARINGS
3.1	Phenomena Affecting the Functioning of Bearings 36
3.2	Types of Lubrication 37
3.3	Hydrodynamic Lubrication 39
3.4	General Equations of Hydrodynamic Lubrication 41
3.5	Film-Lubrication Equations for Viscous Liquids 46
3.6	Film-Lubrication Equations for Gases 50
3.7	Curvilinear Coordinates 55
3.8	Integral Expressions 59
3.9	Boundary Conditions 62
Chapter 4	BEARINGS WITH CONSTANT FORCES AND VELOCITIES : THE TWO-DIMENSIONAL PROBLEM
4.1	The Two-dimensional Problem (Plane motions) 66
4.2	Wedge Film Between Plane Surfaces 70
4.3	Film Between Circular Cylindrical Surfaces 80
4.4	More Accurate Methods of Solving the Plane Problem 124
Chapter 5	BEARING WITH CONSTANT FORCES AND VELOCITIES : THE THREE-DIMENSIONAL PROBLEM
5.1	Plane Surfaces: Michell's Method 144
5.2	Plane Surface with Small slenderness Ratios 151
5.3	Parallel Surfaces 154
5.4	Curved Surfaces : Duffing's Method 157
5.5	A Variational Method of Solving the Three-dimensional Problem 168
Chapter 6	THE THREE-DIMENSIONAL PROBLEM : VARIABLE VISCOSITY
6.1	Circular Cylindrical Surfaces : journal Bearings 183
6.2	Pressure in Journal Bearings 202

6.3	Arbitrary Boundary Conditions	204
6.4	Load, Moment, and Flow Characteristics of Finitely Long, Complete Journal Bearings	219
6.5	Experimental Verifications	237
6.6	Use of Power Series for complete Journal Bearings	239
6.7	Films with finite Plane Surfaces	241
6.8	The Solution of the Three-dimensional Problem for $q=0, \mu = \mu_m$ Constant	254
6.9	The solution of the Three-dimensional Problem for Arbitrary q	257
Chapter 7	FITTED PARTIAL JOURNAL BEARINGS	268
7.1	Determination of Pressure	268
7.2	Load, Frictional, and Flow Characteristics of Fitted Partial Journal Bearings	279
Chapter 8	BEARINGS SURFACES AND FILMS WITH VARYING GEOMETRY	293
8.1	Bearings with Film Thickness Varying Along Axis Ox_3	294
8.2	Films with Thickness Varying Along Axis Ox_1	322
8.3	Bearing with Spherical Surfaces	343
Chapter 9	BEARINGS WITH VARYING LOADS AND VELOCITIES	357
9.1	Introduction	357
9.2	Squeeze Films	358
9.3	Journal Bearings	376
Chapter 10	STABILITY OF MOTION OF LUBRICATED BODIES	412
10.1	Plane surfaces	412
10.2	Complete Journal Bearings	419
10.3	Direct Methods of Analysis	431
Chapter 11	SPECIAL PROBLEMS OF HYDRODYNAMIC LUBRICATION	435
11.1	A General Solution of the Reynolds Equation	435
11.2	The Variation of Viscosity with Pressure	448
11.3	Stream-Function Solutions for Thick Lubricating Films	449
11.4	Moderately Thick Lubricating Films	455
11.5	Rolling Surfaces	463
11.6	Assumptions Concerning Boundary Conditions	469
11.7	Fluid Flows	480
Chapter 12	GAS LUBRICATION	488
12.1	Infinitely Long Bearings	490
12.2	Three-dimensional Films	519
12.3	Unsteady Films	527
Chapter 13	TURBULENT LUBRICATING FILMS	534
13.1	Transition from a Laminar to a Turbulent Regime	534
13.2	Equations of Motion for a turbulent Lubricating Film	534
13.3	Velocity Distribution in a Turbulent Film	536
13.4	The Reynolds Equation for a Turbulent Film	543
13.5	Turbulent Liquid Films	546
13.6	Turbulent Gas Films	558