

CONTENTS

Foreword	v
Preface	vii

I. MATERIALS TECHNOLOGY

The Polarization, Structuring and Rheology of ER Fluids	3
<i>K. M. Blackwood, H. Block, P. Rattray, G. Tsangaris, and D. N. Vorobiev</i>	
First Experiments on Magnetoelectrorheological Fluids (MERFs)	22
<i>W. I. Kordonsky, S. R. Gorodkin, and E. V. Medvedeva</i>	
Cryogenic Electrorheological Fluids	37
<i>R. N. Zitter, X. Zhang, T. J. Chen, and R. Tao</i>	
Controllable Fluids: The Temperature Dependence of Post-Yield Properties	43
<i>K. D. Weiss and T. G. Duclos</i>	
High Dielectric Constant Particulate Materials For Electrorheological Fluids	60
<i>C. A. Randall, D. E. McCauley, C. P. Bowen, T. R. Shrout, and G. L. Messing</i>	
Electrorheological Fluids Based on Polyurethane Dispersions	67
<i>R. Bloodworth</i>	
Surfactant-activated Electrorheological Suspensions	84
<i>Y. D. Kim and D. J. Klingenberg</i>	
Yield Process of Electrorheological Fluid with Polyaniline Particle	100
<i>K. Koyama, K. Minagawa, T. Yoshida, N. Kuramoto, and K. Tanaka</i>	

II. PHYSICAL MECHANISM

Light Scattering Studies of a Model Electrorheological Fluid	115
<i>T. C. Halsey and J. E. Martin</i>	
Simulation of Solid Structure Formation in an Electrorheological Fluid	129
<i>R. Tao and Q. Jiang</i>	
A Conduction Model of Electrorheological Effect	139
<i>N. Felici, J. N. Foulc, and P. Atten</i>	

Theoretical Analysis of Field Induced Structures in ER and MR Fluids	153
<i>G. Bossis, H. Clercx, Y. Grasselli, and E. Lemaire</i>	
Field-Induced Structure of Confined Ferrofluid Emulsion	172
<i>J. Liu, E. M. Lawrence, M. L. Ivey, G. A. Flores, J. Bibette, and J. Richard</i>	
The Evolution of Field-Induced Structure of Confined Ferrofluid Emulsions .	190
<i>J. Liu, T. Mou, G. A. Flores, J. Bibette, and J. Richard</i>	
The Role of Suspension Structure in the Dynamic Response of Electrorheological Suspensions	202
<i>M. Parthasarathy, K. H. Ahn, B. M. Belongia, and D. J. Klingenberg</i>	
Electric-Field-Induced Phase Separation in Electrorheological Fluids	223
<i>X. L. Tang, K.-Q. Zhu, E. Guan, and X.-P. Wu</i>	
Some New Evidence on Electro-Rheological Mechanisms	233
<i>R. Liang and Y. Xu</i>	
Effects of Electrode Morphology on the Electrorheological Response	251
<i>P. V. Katsikopoulos and C. F. Zukoski</i>	

III. PROPERTIES

Viscoelasticity of Electrorheological Fluids: Role of Electrostatic Interactions	267
<i>J. M. Ginder and L. C. Davis</i>	
Fluid Flow and Falling Ball Experiments in ER Fluids	283
<i>R. N. Zitter, T. J. Chen, X. Zhang, and R. Tao</i>	
Influence of Particle Size on the Dynamic Strength of Electrorheological Fluids	294
<i>Y.-H. Shih and H. Conrad</i>	
Static Rheological Properties of Electrorheological Fluids	314
<i>G. L. Gulley and R. Tao</i>	
Dynamics of Structure Deformation and Rheology of Electrorheological Fluids	328
<i>E. Lemaire, G. Bossis, Y. Grasselli, and A. Meunier</i>	
Determination of Rheological and Electrical Parameters of ER Fluids Using Rotational Viscometers	344
<i>H. Janocha and B. Rech</i>	

Experimental Study of Yield Stresses in Electrorheological Fluids	358
J. N. Foulc and P. Atten	
 The Effect of Solid Fraction Concentration on the Time Domain	
Performance of an ER Fluid in the Shear Mode	372
J. Makin, W. A. Bullough, R. Firoozian, A. R. Johnson, and A. Hosseini-Sianaki	
 Electrostatic Interactions for Particle Arrays in Electrorheological Fluids:	
I. Calculations	393
Y.-H. Shih, A. F. Sprecher, and H. Conrad	
 Electrostatic Interactions for Particle Arrays in Electrorheological Fluids:	
II. Measurements	412
Y. Chen and H. Conrad	
 Pressure Coupling in the Electrical Response of Electro-Rheological Valves .	421
M. Whittle, R. Firoozian, W. A. Bullough, and D. J. Peel	
 Properties of Electrorheological (ER) Fluids under Periodic	
Deformation	440
W. I. Kordonsky, A. D. Matsepuro, S. A. Demchuk, and Z. A. Novikova	
 Influence of the Electric Field Frequency on the Electrorheological Fluids	
Properties	453
C. Boissy, J. N. Foulc, and P. Atten	
 Preliminary Optical Study on ER Fluids	463
L. W. Zhou, J. F. Ye, R. B. Tao, Y. Tang, J. F. Peng, Z. Gao, L. Y. Liu, S. H. Ma, and W. C. Wang	
 Pressure Responses of ER Fluid in a Piston Cylinder-ER Valve System . . .	477
M. Nakano and T. Yonekawa	

IV. APPLICATIONS

Electro-Rheological Catch/Clutch: Inertial Simulations	493
A. R. Johnson, J. Makin, and W. A. Bullough	
 Dielectrophoretic Assembly: A Novel Concept in Advanced Composite	
Fabrication	516
C. A. Randall, C. P. Bowen, T. R. Shrout, G. L. Messing, and R. E. Newnham	
 Two Dimensional Bingham Plastic Flow in a Cylindrical Pressurised Clutch .	526
R. J. Atkin, T. J. Corden, T. G. Kum, and W. A. Bullough	

Bingham Plastic Analysis of ER Valve Flow	538
<i>D. J. Peel and W. A. Bullough</i>	
Simulation and Experimental Study of a Semi-Active Suspension with an Electrorheological Damper	568
<i>X. M. Wu, J. Y. Wong, M. Sturk, and D. L. Russell</i>	
Applications of Electrorheological Fluid in Shock Absorbers	587
<i>Wei Chenguan and Fu Zhao</i>	
On-Off Excitation Switch for ER Devices	597
<i>R. C. Tozer, C. T. Orrell, and W. A. Bullough</i>	
Hydrodynamic Pressure Generation with an Electro-Rheological Fluid Part I - Unexcited Fluid	608
<i>T. H. Leek, S. Lingard, W. A. Bullough, and R. J. Atkin</i>	
Hydrodynamic Pressure Generation with an Electro-Rheological Fluid Part II - Excited Fluid	625
<i>T. H. Leek, S. Lingard, W. A. Bullough, and R. J. Atkin</i>	
Selection of Commercial Electro-Rheological Devices	643
<i>D. A. Brooks</i>	
Heat Transfer Modelling of a Cylindrical ER Catch	657
<i>R. Smyth, K. H. Tan, and W. A. Boullough</i>	
Index	676