

Contents

Introduction	vii
Contents	xv
1 Modeling of Electrorheological Fluids	1
1.1 General Balance Laws	1
1.2 Electrorheological Fluids	9
1.3 Linear Models for the Stress Tensor \mathbf{T}	15
1.3.1 Compressible Electrorheological Fluids	18
1.3.2 Incompressible Electrorheological Fluids	20
1.3.3 Mechanically Incompressible but Electrically Compressible Electrorheological Fluids	21
1.4 Shear Dependent Electrorheological Fluids	24
2 Mathematical Framework	39
2.1 Setting of the Problem and Introduction	39
2.2 Function Spaces	43
2.3 Maxwell's Equations	54
3 Electrorheological Fluids with Shear Dependent Viscosities: Steady Flows	61
3.1 Introduction	61
3.2 Weak Solutions	62
3.3 Strong Solutions	71
3.3.1 Approximations	74
3.4 Existence of Approximate Solutions	84
3.5 Limiting Process $A \rightarrow \infty$	93
3.6 Limiting Process $\varepsilon \rightarrow 0$	101
4 Electrorheological Fluids with Shear Dependent Viscosities: Unsteady Flows	105
4.1 Setting of the Problem and Main Results	105
4.1.1 Approximations	110
4.2 Existence of Approximate Solutions	114
4.3 Limiting Process $A \rightarrow \infty$	126
4.4 Limiting Process $\varepsilon \rightarrow 0$	142
5 Appendix	153
5.1 General Auxiliary Results	153
5.2 Auxiliary Results for the Approximations	158
References	165
Index	175



<http://www.springer.com/978-3-540-41385-1>

Electrorheological Fluids: Modeling and Mathematical
Theory

Ruzicka, M.

2000, XIV, 178 p., Softcover

ISBN: 978-3-540-41385-1