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Titolo	Control Theory in Rheology : An Introduction to Practical Applications / / by Tommi Borg
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ISBN	3-031-88248-2
Edizione	[1st ed. 2025.]
Descrizione fisica	1 online resource (XIII, 225 p. 123 illus., 59 illus. in color.)
Disciplina	531.1134
Soggetti	Rheology Mathematical physics Fluid mechanics Automatic control Materials science - Data processing Mathematical Methods in Physics Engineering Fluid Dynamics Control and Systems Theory Computational Materials Science
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	1.Theoretical and Practical Rheology -- 2.The Principle of Control Theory (CT) -- 3.Basics of distribution Functions -- 4.Steady Shear Viscosity -- 5.Complex Viscosit -- 6.Relaxation Modulus -- 7. Converting RED function to MWD -- 8.From MWD to RED and back again -- 9.From measured viscosity data to MWD -- 10.Start-up and transient flow effects -- 11.Elongational viscosity -- 12.Temperature and viscoelastic relations -- 13.Computation Cases -- 14.Overview of the Unified Model -- 15.Hemorheological method for analyses -- 16. Comparison With other known models.
Sommario/riassunto	This book bridges the gap between theoretical rheology and practical industry applications by introducing Control Theory (CT) and the linear Unified Model. This approach enables the modelling and analysis of various viscoelastic flows as well as polymer and macromolecular structures. In practical engineering, the design of machinery and

equipment for polymers often relies on handbooks, respective textbooks, and numerous CAD-aided software tools based on empirical formulas. This book presents many useful viscoelastic constitutive equations for analysing and model shear and complex flows, relaxation modulus and spectrum, elongation, transient viscosity, and for computing the Molecular Weight Distribution (MWD) from viscoelastic measurements. The book adopts a counterintuitive approach, starting afresh and proceeding chronologically from steady-state viscosity and other flows relevant to practical engineering to the theoretical formulas of relaxation phenomena. It simplifies unnecessary complexity while still drawing on the well-documented motions of molecular chains. Furthermore, the book offers deeper insights into the background of power-law theories and the Cox-Merz rule, supplying new formulas for the relaxation modulus, spectrum, and various modules through the application of unified formulas. Professionals and scholars alike will find it a handy reference tool.

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