

## Book Review

***Beyond Equilibrium Thermodynamics***, H.C. Öttinger, John Wiley & Sons Inc., 111 River St., Hoboken, NJ 07030. 2005, 625 pages, ISBN: 0471666580.

Are you ready for an inexact treatment of thermodynamics? Nonequilibrium thermodynamics is the key to understanding time-dependent relationships. The author has taken an interesting approach, philosophical in nature, in presenting information on this topic. The introduction chapter is actually an overview of his approach. He states, "... the term 'beyond-equilibrium' ... indicate(s) that we want to go far beyond equilibrium ...". And that he does! The book is divided into two parts: Phenomenological and Statistical. The former contains chapters on Hydrodynamics, Linear Irreversible Thermodynamics, Complex Fluids, and Relativistic Hydrodynamics. The latter contains chapters on Projection-Operator Method, Kinetic Theory of Gases, and Simulations. The author is a professor of Polymer Physics and former chair of Materials Science department at the ETH, Zurich (Swiss Federal Institute of Technology). He is a member of the Society of Rheology, Physical Society, and Rheology and Polymer Groups. He serves on the editorial boards for Applied Rheology, Journal of Rheology, and Multiscale Modeling and Simulation.

The author assumes the reader has a strong background in thermodynamics. Part I covers irreversible processes,

classical linear regimes, and non-linear regimes. Part II culminates with the final chapter on simulations.

Interestingly, the author included thirteen pages listing notations used in the book and the sections that they are introduced in. It is quite a unique listing of Latin, Greek, mathematical symbols. There are over 200 example problems presented throughout the book and ALL of them are solved (actually solved, not just an answer) in the back of the book; over 90 pages are devoted to this important aspect of learning! The subject index has over 20 pages, which allows ease of looking up a particular subject. There are over 20 appendices that cover such things as: crash-course on equilibrium thermodynamics, mechanics and geometry, functional derivatives, and quantum systems.

This book would best serve graduate students in engineering and scientists working in this field. The philosophical nature of the book probably does not fit for engineers working in this area. However, there are many practical applications included in each chapter that engineers might find enlightening; most complex fluids in industry exhibit highly nonlinear material behavior.

*Dr. Wayne Reitz*  
Reitz Consulting Ltd.,  
96 Meadowlark Lane,  
Fargo, ND 58102