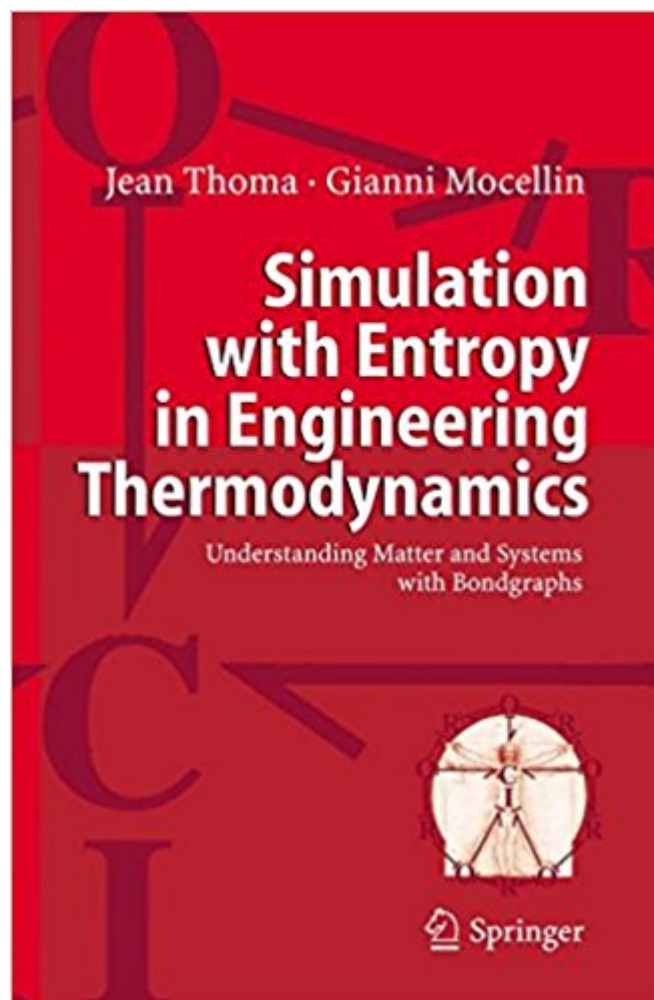




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# Simulation With Entropy In Engineering Thermodynamics: Understanding Matter And Systems With Bondgraphs



## Synopsis

Students, academics and researchers will find this book an invaluable contribution to the understanding of thermodynamics. In this new treatment of the subject, the authors focus on the principles of thermodynamic variables and the practical simulation of thermodynamic systems, and endeavor to show how simple thermodynamics really is. It offers a unique view of modern complex systems engineering and its ramifications.

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Students, academics and researchers will find this book an invaluable contribution to the understanding of thermodynamics. In this new treatment of the subject, the authors focus on the principles of thermodynamic variables and the practical simulation of thermodynamic systems, and endeavour to show how simple thermodynamics really is by applying two innovations: The use of entropy as thermal charge and not as the incomprehensible Clausius integral (an idea which applies only in special cases); The use of Bond Graphs to represent relations among variables. This tool from control and systems engineering has been treated extensively in other publications by Springer, including two books by Prof. Thoma, and is succinctly explained here in an appendix. The book opens with thermodynamics as universal science and with entropy as carrier of thermal power, and goes on to consider the effects of friction, including the Carnot cycle. Next, it treats systems with variable mass and variable mass flow and extends the concepts to chemical reactions and osmosis. Finally, descending by some 20 orders of magnitude, it considers single atoms and degrees of freedom of atoms, with statistical aspects of information theory. There are also sections

on biology (written in collaboration with Prof. Henri Atlan of Paris and Jerusalem) and on earth science (global warming). A modern approach with a strong emphasis on interdisciplinary engineering, this book offers a unique view of modern complex systems engineering and its ramifications, and contributes to the advance of pluridisciplinarity among scientists. The Authors Prof. Jean U. Thoma: Ph. D. in Physics, Professor of Mechanical Engineering. Originally a physicist who journeyed from hydrostatic engineering to biology through Bond Graphing and author of many books and publications on these subjects. Dr. Gianni Mocellin, Civil Engineer, Master in Business Administration, Master in Artificial Intelligence, Ph. D. in Economics, user of Bond Graphs, a pluridisciplinarian in the true sense and an accomplished practitioner in psychology, robotics and expert systems.

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