Response of Complex Dynamical Systems to Complex Mechanical Energy Sources (SpringerBriefs in Physics)

By John J. McCoy

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This book presents a previously unpublished theory for predicting the quantitative behavior of a class of dynamical systems when brought into contact with a source of mechanical energy, when both the system and the source are complex. Complex refers to a virtually unbounded number of quantitative parameters being needed for a complete description, the precise values of which are inherently unknowable. The complexity precludes the use of a complete and completely accurate prediction model, necessitating the construction of an effective theory, a mathematical framework for estimating less than complete system behavior while accommodating less than all underlying physical processes. Predicting less, the effective theory does not require a complete system description, but rather only the values of a limited number of global measures, these to be determined by a process of normalizing the theory.

In the text, the dynamical system is identified as a meta-mass comprising a grounded housing element containing a large multiplicity of oscillators and the theory describes the non-Newtonian behavior of the basic element for a virtually inexhaustible class of non-classical mechanical and mechanical/electrical systems. The non-Newtonian behavior of primary interest is an enhanced energetics, referring to the energy transfer between the meta-mass housing element and an external source. Internal energy transfer between the meta-mass housing element and the encapsulated oscillators is the occasion of changes in the external energy transfer, which has no counterpart in Newtonian mechanics. This makes the effective theory essential for designing mechanical and mechanical/electrical devices that exploit the enhanced energetics. Dynamical system complexity brings to the fore mechanical energy source complexity, which otherwise can be ignored. This book presents a tailoring of the effective theory in the face of mechanical energy source complexity, as an alternative to

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Editorial Review

From the Back Cover

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