

Preface

A model is a theory which predicts the evolution of a structure. The basic elements of a mechanical predictive theory are described. They involve the choice of the state quantities which characterize the investigated physical phenomenon, the basic equations of mechanics: the equations of motion, the laws of thermodynamics and the constitutive laws. The theory is applied to phase change. Phase change involves microscopic motions which have macroscopic effects. These motions are taken into account in the macroscopic predictive theories. Numerous examples which are used or may be used in engineering are given for different phase change and damage problems. Moreover, when phase change occurs, temperatures may be discontinuous, for instance when warm rain falls on frozen soil. This situation is also investigated.

Some of these problems have been investigated in the framework of the Laboratorio Lagrange with Italian, Tunisian and French scientists, Francesco Ascione, Elena Bonetti, Anna Maria Caucci, Eric Dimnet, Christian Duquennoi, Francesco Freddi, Rym Lassoued, Boumediene Nedjar, Francesca Nerilli and Elisabetta Rocca. All of them are warmly thanked.

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