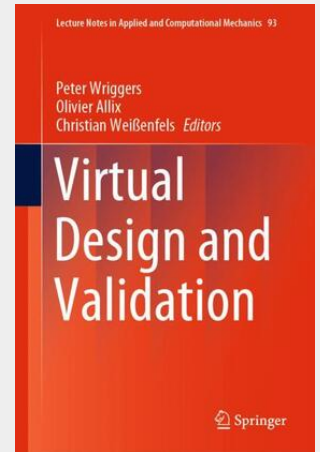


Virtual Design and Validation

This book provides an overview of the experimental characterization of materials and their numerical modeling, as well as the development of new computational methods for virtual design. Its 17 contributions are divided into four main sections: experiments and virtual design, composites, fractures and fatigue, and uncertainty quantification. The first section explores new experimental methods that can be used to more accurately characterize material behavior. Furthermore, it presents a combined experimental and numerical approach to optimizing the properties of a structure, as well as new developments in the field of computational methods for virtual design. In turn, the second section is dedicated to experimental and numerical investigations of composites, with a special focus on the modeling of failure modes and the optimization of these materials. Since fatigue also includes wear due to frictional contact and aging of elastomers, new numerical schemes in the field of crack modeling and fatigue prediction are also discussed. The input parameters of a classical numerical simulation represent mean values of actual observations, though certain deviations arise: to illustrate the uncertainties of parameters used in calculations, the book's final section presents new and efficient approaches to uncertainty quantification.



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