1. Record Nr. UNINA9910337633603321

Titolo	Advances in Predictive Models and Methodologies for Numerically Efficient Linear and Nonlinear Analysis of Composites / / edited by Marco Petrolo
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2019
ISBN	3-030-11969-6
Edizione	[1st ed. 2019.]
Descrizione fisica	1 online resource (198 pages)
Collana	PoliTO Springer Series, , 2509-6796
Disciplina	620.118
Soggetti	Mechanics Mechanics, Applied Aerospace engineering Astronautics Ceramics Glass Composites (Materials) Composite materials Solid Mechanics Aerospace Technology and Astronautics Ceramics, Glass, Composites, Natural Materials
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Introduction -- Variable kinematic shell formulations accounting for multi-field effects for the analysis of multi-layered structures -- Bistable buckled beam-like structures by one-dimensional hierarchical modeling -- Multiscale nonlinear analysis of beam structures by means of the Carrera Unified Formulation -- On the effectiveness of higher-order one-dimensional models for physically nonlinear problems -- Post-buckling progressive failure analysis of composite panels using a two-way global-local coupling approach including intralaminar failure and debonding -- Mesoscale hyperelastic model of a single yarn under high velocity transverse impact -- Structural health monitoring: numerical simulation of Lamb waves via higher-order models --

Improving the static structural performance of panels with spatially varying material properties using correlations -- Multiscale identification of material properties for anisotropic media: a general inverse approach -- Metamodel-based uncertainty quantification for the mechanical behavior of braided composites.

Sommario/riassunto

This book gathers contributions addressing issues related to the analysis of composite structures, whose most relevant common thread is augmented numerical efficiency, which is more accurate for given computational costs than existing methods and methodologies. It first presents structural theories to deal with the anisotropy of composites and to embed multifield and nonlinear effects to extend design capabilities and provide methods of augmenting the fidelity of structural theories and lowering computational costs, including the finite element method. The second part of the book focuses on damage analysis; the multiscale and multicomponent nature of composites leads to extremely complex failure mechanisms, and predictive tools require physics-based models to reduce the need for fitting and tuning based on costly and lengthy experiments, and to lower computational costs; furthermore the correct monitoring of in-service damage is decisive in the context of damage tolerance. The third part then presents recent advances in embedding characterization and manufacturing effects in virtual testing. The book summarizes the outcomes of the FULLCOMP (FULLy integrated analysis, design, manufacturing, and health-monitoring of COMPosite structures) research project.