
Modeling of Extreme Waves in Technology and Nature

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Abstract

The results presenting in "Sh U Galiev, Modeling of Extreme Waves in Technology and Nature. CRC Press (Taylor & Francis), 2020" are reported. In the first volume of this book named "Evolution of Extreme Waves and Resonances", the theory of waves is generalized on cases of strongly nonlinear waves, multivalued waves and particle-waves. The appearance of these waves in various continuous media and physical fields is explained by resonances and nonlinearity effects. It is explored extreme waves emerging in different artificial and natural systems from atom scale to the Universe. Vast amounts of experimental data and compares them with the results of the developed theory are presented. The volume is designed as a professional reference for those working in the wave analysis and modeling. In the second volume of this book "Extreme Waves and Shock-Excited Processes in Structures and Space Objects", the theory of waves is generalized on cases when waves change medium in which appear and propagate. A reaction of structural elements and space objects to the dynamic actions of the different nature, durations and intensities is studied. It considers the effects of transitions in the state and phase equations of media on the formation and propagation of extreme waves as a result of force, thermal, or laser pulsed action. The influence of cavitation and cool boiling of liquids, geometric and physical nonlinearity of walls on containers strength and the formation of extreme waves is studied. The theory can be also used to optimize impulse technology. In particular, in the optimization of explosive processing of sheet metal by explosion in a liquid.

The book was written for Master's and Ph.D., as well as for students, researchers and engineers in the fields of geophysics, nonlinear wave studies, cosmology, physical oceanography, and technology and ocean engineering.

Keywords: Extreme nonlinear waves, resonators, ocean, review

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