

# NONLINEAR DYNAMICS OF ENGINEERING SYSTEMS

*Compiled and edited by J.M.T. Thompson and W. Schiehlen*

This volume represents a collection of papers from engineering and mechanics which apply the new geometrical phase space techniques of nonlinear dynamics to practical problems of industrial relevance. The models exhibit rich bifurcational and chaotic behaviour. The papers are highly illustrated, with a minimum of mathematical detail, suitable for a general wide readership. Engineering contributions cover the vehicle dynamics of railway bogies and rolling ships; the design of belt conveyors and turbine blades; and the use of chaotic fluid flow to enhance transportation properties. The last three papers address archetypal mechanical oscillators that arise throughout engineering science: two focus on systems with impacts, generated for example by play or backlash, while the final paper presents a practical criterion for chaotic crises in the resonance of typical softening systems.

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# **ENERGETIC MATERIALS**

*Edited by J.E. Field and P. Gray*

This volume covers a broad spectrum of modern research, both experimental and theoretical, on energetic materials and should be of interest to anyone involved in using, researching into or studying explosives, propellants or pyrotechnics. The topics covered range from experimental studies on dislocations and the mechanisms of 'hot spot' ignition to the physics and chemistry of fully developed detonations. New synthesis routes for energetic materials based on nitration by  $N_2O_5$  are described which overcome the drawbacks of conventional approaches.

This research should facilitate the synthesis of nitramine explosives and energetic binders. Significant advances have been made in understanding thermochemistry and reaction pathways using quantum chemical methods and this work has been complemented by sophisticated thermal heating techniques which, combined with FTIR spectroscopy, give information on the early stages of condensed phase chemistry. New ideas are discussed for considering the behaviour of chemical species in a shock front, for performing *ab initio* molecular orbital calculations on simple molecules and for explaining how amines sensitize nitrocompounds. Analytical and numerical work on equations of state and detonation allow the performance of explosives to be predicted and assessed.

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