

Contents

Introduction to NDATED	v
Marian Wiercigroch and Giuseppe Rega	
Part I New Nonlinear Dynamics Methods and Theories	
Noise-Induced Jumping Prior to a Fold: Applied to Climate Tipping Predictions	3
J. Michael T. Thompson and Jan Sieber	
Computation of the Basins of Attraction in Non-smooth Dynamical Systems	17
Ugo Galvanetto and Alessandro Colombo	
Two Formulations of Nonlinear Normal Vibration Modes and Their Applications	31
Yuri V. Mikhlin	
Soliton-Mediated Electron Transfer and Electric Transport Arising from Coupling Electron Quantum Mechanics to Nonlinear Elasticity in Anharmonic Crystal Lattices	47
M.G. Velarde, W. Ebeling, and A.P. Chetverikov	
Dynamics of a Large Ring of Unidirectionally Coupled Duffing Oscillators	63
P. Perlikowski, S. Yanchuk, M. Wolfrum, A. Stefanski, and Tomasz Kapitaniak	
Real-Time Subspace Tracking for Condition Monitoring Using Karhunen–Loève–Transform	73
Edwin Kreuzer and Michael Steidl	

Stability of the Elliptically Excited Pendulum Using the Homoclinic Melnikov Function	87
Richard A. Morrison and Marian Wiercigroch	
Viscous Damping, Plasticity and Buckling on Large Amplitude Vibrations of Beams	95
Pedro Ribeiro	
Part II Smooth Engineering Systems	
Motion of Oscillating Two-Link System in Fluid	109
Felix L. Chernousko	
Nonlinear Dynamics of Low-Prandtl Number Rayleigh-Bénard Convection	123
Pankaj Wahi, P.K. Mishra, S. Paul, and M.K. Verma	
Mixed-Modal Self-Excited Oscillation of Fluid-Conveying Cantilevered Pipe with End Mass	137
Kiyotaka Yamashita, Hiroshi Yabuno, Yuuki Hirose, and Masatsugu Yoshizawa	
Parametric Study for Lock-In Detection in Vortex-Induced Vibration of Flexible Risers	147
Marko Keber, Marian Wiercigroch, and Jerzy Warminski	
Importance of Accurately Modeling Nonlinear Damping in Predicting Parametric Ship Rolling	159
Hisham Moideen and Jeffrey M. Falzarano	
Practical Stability of Rotating Solutions in a Parametrically Excited Experimental Pendulum via Dynamical Integrity Concepts	173
Stefano Lenci, William Luzi, Enrico Venturi, and Giuseppe Rega	
Dynamics, Synchronization and Control of Parametric Pendulums	185
Anna Najdecka, Vahid Vaziri, and Marian Wiercigroch	
A Combined Semi-analytical and Experimental Approach for Multiphysical Nonlinear MEMS Resonators	195
R.M.C. Mestrom, Rob H.B. Fey, K.L. Phan, and H. Nijmeijer	
Vibration Reduction Using Shape Memory Alloys	209
Marcelo A. Savi, R.A.A. Aguiar, and P.M.C.L. Pacheco	
Nonlinear Dynamics and Instability as Important Design Concerns for a Guyed Mast	223
Diego Orlando, Paulo B. Gonçalves, Giuseppe Rega, and Stefano Lenci	

A Problem of Stability in Milling Process of Materials Used in Aviation Industry	235
Rafal Rusinek, Krzysztof Kecik, and Jerzy Warminski	
Dynamical Integrity for Interpreting Experimental Data and Ensuring Safety in Electrostatic MEMS	249
Laura Ruzziconi, Mohammad I. Younis, and Stefano Lenci	
Suppressing Aeroelastic Instability in a Suspension Bridge Using a Nonlinear Absorber	263
B. Vaurigaud, L.I. Manevitch, and C.-H. Lamarque	
Part III Non-smooth Engineering Systems	
Near-Grazing Dynamics of Macro-scale and Micro-scale Cantilevers with Nonlinear Tip Interaction Forces	281
Ishita Chakraborty and Balakumar Balachandran	
Reduced Inductance in DC-DC Converter Circuits via the Application of Filippov's Method	295
O. Imrayed, B. Zahawi, Damian Giaouris, and V. Pickert	
Dynamics of a Drifting Impact Oscillator with a Conical Profile	313
Olusegun Ajibose, Marian Wiercigroch, Ekaterina Pavlovskaja, Alfred Akisanya, and Gyory Kafoyli	
Bit-Bounce and Stick-Slip in Drill-String Dynamics	323
K. Nandakumar, Marian Wiercigroch, and Chris Pearson	
Analysis of Stick-Slip Oscillations of Drill-String via Cosserat Rod Model	337
Marcos Silveira, Charles Wang, and Marian Wiercigroch	
Mechanical Oscillator in a Magnetic Field	347
J.-H. Ho, Ko-Choong Woo, V.C.-C. Lee, and Y.A. Abakr	
Part IV Nonlinear Control of Engineering Systems	
Control of Intrinsic Localized Mode in Coupled Cantilever Array	359
Masayuki Kimura and Takashi Hikihara	
Dynamic Control and Ground-Based Experiments of a Tethered Satellite System	375
Haiyan Hu, H. Wen, and D.P. Jin	
Chaos Control Methods Applied to Avoid Bifurcations in Pendulum Dynamics	387
Aline S. de Paula, Marcelo A. Savi, Marian Wiercigroch, and Ekaterina Pavlovskaja	

A Study on Swing up Control for Rotation of Parametric Pendulum.....	397
Yuichi Yokoi and T. Hikihara	
On Nonlinear Dynamics and Control Design in a “MEMS” Gyroscope System	407
Fábio Roberto Chavarette, José Manoel Balthazar, and Jorge Luis Palacios Felix	
Control of Chains of Mass Points in a Frictional Environment	421
Carsten Behn and Klaus Zimmermann	
Author Index	435
Subject Index	441

IUTAM Symposium on Nonlinear Dynamics for Advanced
Technologies and Engineering Design

Proceedings of the IUTAM Symposium on Nonlinear
Dynamics for Advanced Technologies and Engineering
Design, held Aberdeen, UK, 27-30 July 2010

Wiercigroch, M.; Rega, G. (Eds.)

2013, XII, 454 p., Hardcover

ISBN: 978-94-007-5741-7