

Contents

Part I Problems in Vehicle Dynamics

Typical Non-smooth Elements in Vehicle Systems	3
Hans True	
Application of Nonlinear Stability Analysis in Railway Vehicle Industry ..	15
Oldrich Polach	
Closed-Form Analysis of Vehicle Suspension Ride and Handling Performance	29
Mehdi Ahmadian	
Limit Wheel Profile for Hunting Instability of Railway Vehicles	41
Laura Mazzola, Stefano Alfi, F. Braghin, and S. Bruni	
Low-Cost Maintenance Operation for Avoiding Hunting Instability in a Metro Vehicle	53
F. Braghin, Stefano Alfi, S. Bruni, and A. Collina	
Acoustic Optimization of Wheel Sets	67
Michael Beitelschmidt, Volker Quarz, and Dieter Stüwing	
Measurement, Modelling and Simulation of Curve Squealing of Trains ..	73
Christoph Glocker, Eric Cataldi-Spinola, Rossano Stefanelli, and Jürg Dual	
Selected Problems of Non-linear (Non-smooth) Dynamics of Rail Vehicles in a Curved Track	87
Krzysztof Zboiński	
On Tangential Friction Induced Vibrations in Brake Systems	101
Georg Peter Ostermeyer	

Dry Friction Element with Logical Switch for Numerical Simulation of Vehicle Dynamics and Its Application	113
Anna Orlova	
Damper Modelling and Its Implementation in Railway Simulation Program	123
Asier Alonso and J.G. Giménez	
Suppression of Bumpstop Instabilities in a Quarter-Car Model	137
Fredrik Svahn, Jenny Jerrelind, and Harry Dankowicz	
Experimental Modal Analysis of Towed Elastic Tyres During Rolling	149
Dénes Takács and Gábor Stépán	
Modelling and Simulation of Longitudinal Tyre Behaviour	161
Jaap P. Meijaard	
Part II Dynamics of Non-smooth Problems	
Bifurcations in Non-smooth Models of Mechanical Systems	173
Piotr Kowalczyk and Arne Nordmark	
Vibrational Displacement Determined by Constructive and Force Asymmetry of System	187
Iliya I. Blekhman	
Smoothing Dry Friction by Medium Frequency Dither and Its Influence on Ride Dynamics of Freight Wagons	189
Jerzy Piotrowski	
Simulation of Gear Hammering With a Fully Elastic Model	195
Pascal Ziegler and Peter Eberhard	
Part III Numerical Analysis of Non-smooth Problems	
Discontinuities in ODEs: Systems with Change of State	211
Per Grove Thomsen	
Towards Improved Error Estimates for Higher Order Time Integration of ODEs with Non-Smooth Right Hand Side	227
Martin Arnold	

Sensitivity Analysis of Discontinuous Multidisciplinary Models: Two Examples	239
Andreas Pfeiffer and Martin Arnold	
Smoothing Discontinuities in the Jacobian Matrix by Global Derivatives	253
Georg Rill	
Index	263