# Contents

## Part I Fractional Dynamics and Nonlinearity

1. **Nonlinear Self-Adjointness for some Generalized KdV Equations** .......................... 3  
   M.L. Gandarias and M. Rosa

2. **Weak Self-Adjointness and Conservation Laws for a Family of Benjamin-Bona-Mahony-Burgers Equations** ............... 23  
   M.S. Bruzón

3. **Some Analytical Techniques in Fractional Calculus: Realities and Challenges** ................................................... 35  
   Dumitru Baleanu, Guo-Cheng Wu, and Jun-Sheng Duan

4. **Application of the Local Fractional Fourier Series to Fractal Signals** ........................................................... 63  
   Xiao-Jun Yang, Dumitru Baleanu, and J. A. Tenreiro Machado

5. **Parameter Optimization of Fractional Order $PI^{\lambda}D^{\mu}$ Controller Using Response Surface Methodology** ........... 91  
   Beyza Billur Iskender, Necati Özdemir, and Aslan Deniz Karaoglan

6. **Dynamical Response of a Van der Pol System with an External Harmonic Excitation and Fractional Derivative** ........... 107  
   Arkadiusz Syta and Grzegorz Litak

7. **Fractional Calculus: From Simple Control Solutions to Complex Implementation Issues** ....................................... 113  
   Cristina I. Muresan

8. **Emerging Tools for Quantifying Unconscious Analgesia: Fractional-Order Impedance Models** .................................. 135  
   Amélie Chevalier, Dana Copot, Clara M. Ionescu, J. A. Tenreiro Machado, and Robin De Keyser
Part II  Chaos and Complexity

9 1D Cahn–Hilliard Dynamics: Coarsening and Interrupted Coarsening ................................................................. 153
Simon Villain-Guillot

10 Nonlinear Analysis of Phase-locked Loop-Based Circuits .......... 169
R.E. Best, N.V. Kuznetsov, G.A. Leonov, M.V. Yuldashev, and R.V. Yuldashev

11 Approaches to Defining and Measuring Assembly Supply Chain Complexity ...................................................... 193
V. Modrak and D. Marton

12 Non-commutative Tomography: Applications to Data Analysis ...... 215
Françoise Briolle and Xavier Leoncini

13 Projective Synchronization of Two Gyroscope Systems with Different Motions ............................................. 255
Fuhong Min and Albert C. J. Luo

14 Measuring and Analysing Nonlinearities in the Lung Tissue ........ 273
Clara M. Ionescu

Part III  Discontinuous Dynamics

15 Drilling Systems: Stability and Hidden Oscillations .................. 287
M.A. Kiseleva, N.V. Kuznetsov, G.A. Leonov, and P. Neittaanmäki

16 Chaos in a Piecewise Linear System with Periodic Oscillations ...... 305
Chunqing Lu

17 Basins of Attraction in a Simple Harvesting System with a Stopper ............................................................... 315
Marek Borowiec, Grzegorz Litak, and Stefano Lenci

18 Analytical Dynamics of a Mass –Damper –Spring Constrained System .......................................................... 323
Albert C. J. Luo and Richard George

Part IV  Engineering and Financial Nonlinearity

19 Formations of Transitional Zones in Shock Wave with Saddle-Node Bifurcations ........................................... 347
Jia-Zhong Zhang, Yan Liu, Pei-Hua Feng, and Jia-Hui Chen

20 Dynamics of Composite Milling: Application of Recurrence Plots to Huang Experimental Modes .................. 359
G. Litak, R. Rusinek, K. Kecik, A. Rysak, and A. Syta
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>The Dynamics of Shear-Type Frames Equipped with Chain-Based Nonlinear Braces</td>
<td>369</td>
</tr>
<tr>
<td></td>
<td>Enrico Babilio</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>In-Plane Free Vibration and Stability of High Speed Rotating Annular Disks and Rings</td>
<td>389</td>
</tr>
<tr>
<td></td>
<td>Hamid R. Hamidzadeh and Ehsan Sarfaraz</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Patent Licensing: Stackelberg Versus Cournot Models</td>
<td>409</td>
</tr>
<tr>
<td></td>
<td>Oana Bode and Flávio Ferreira</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Privatization and Government Preferences in a Mixed Duopoly: Stackelberg Versus Cournot</td>
<td>421</td>
</tr>
<tr>
<td></td>
<td>Fernanda A. Ferreira and Flávio Ferreira</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Index</td>
<td>431</td>
</tr>
</tbody>
</table>
Discontinuity and Complexity in Nonlinear Physical Systems
Machado, J.T.; Baleanu, D.; Luo, A.C.J. (Eds.)
2014, XIII, 433 p. 166 illus., 87 illus. in color., Hardcover
ISBN: 978-3-319-01410-4