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Employment History

Dec. 2016 – present: Research Fellow from the Royal Academy of Engineering, Department of Engineering Mathematics, University of Bristol, UK.

May 2016 – Nov. 2016: Marie-Curie Individual Research Fellow, Department of Engineering Mathematics, University of Bristol, UK.

Nov. 2015 – Apr. 2016: Research Associate funded by Engineering Nonlinearity EPSRC Programme Grant, Department of Mechanical Engineering, University of Bristol, UK.

Nov. 2014 - Oct. 2015: Marie-Curie COFUND Research Fellow from the University of Liège, Belgium. Visiting Postdoc in the Department of Engineering Mathematics at the University of Bristol, UK.

Oct. 2010 - Oct. 2014: PhD student in the Aerospace and Mechanical Engineering Department of the University of Liège, Belgium. FRIA Fellowship from the Belgian Science Foundation (F.R.S.-FNRS).

Education History

2010 - 2014: PhD in Engineering Science at the University of Liège under the supervision of Prof. G. Kerschen. Thesis title: "*Nonlinear Modal Analysis of Conservative and Nonconservative Aerospace Structures.*"

2008 - 2010: Master's degree in Aerospace Engineering obtained with great honours, University of Liège.

2005 - 2008: Bachelor's degree in Engineering Science, University of Liège.

Awards

1. *ENOC Young Scientist Prize* awarded at the *8th European Nonlinear Dynamics Conference* (ENOC), Vienna, Austria, 2014.
2. Best student paper Award: "*…in recognition of a technical conference paper and presentation that meets high expectations for content, originality, significance, and delivery."* Obtained at the *International conference on Multibody Systems, Nonlinear Dynamics, and Control* (MSNDC), ASME conference, Portland, USA, 2013.
3. *Wallonie Espace Award* for the `best Master Thesis´ in aerospace Engineering, Belgium, 2010.

Fellowships & grants received

1. Royal Academy of Engineering (RAEng) Research Fellowship (5 years, 600k£).
2. Marie-Curie Fellowship, Department of Engineering Mathematics, University of Bristol (2 years, 189k€).
3. Marie-Curie COFUND Research Fellowship (1 year), University of Liège co-funded by the European Union (85K €).
4. FRIA PhD Fellowship (4 years) from the Belgian Science Foundation (F.R.S.-FNRS) supervised by Prof. G. Kerschen.

Organized meetings, mini-symposia & courses

1. Co-organizer of a mini-symposium at European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS 2016, Crete, Greece, June 2016.
2. Co-organizer of the nonlinear dynamics session at the yearly International Modal Analysis (2016, 2017).
3. Co-organizer with A. Vakakis and G. Kerschen of the pre-conference course #104 on *Theoretical and Experimental Modal Analysis of Nonlinear Mechanical Systems* organized at the IMAC XXXIV (Orlando, USA), 2016.

Professional memberships

Member of the American Society of Mechanical Engineers (ASME)
Member of the Society for Experimental Mechanics (SEM)
Member of the Society for Industrial and Applied Mathematics (SIAM)

Teaching experiences

Group supervision in Mathematical and Data Modelling 2, Department of Engineering Mathematics, University of Bristol, UK.

Invited Lecturer in the course of Nonlinear Dynamics and Chaos organised by Drs Gross & Musada, Department of Engineering Mathematics, University of Bristol, UK.

Teaching assistant in: 1) Kinematics and Dynamics of Mechanisms (Prof. Brüls, University of Liège), 2) Newtonian Mechanics (Prof. Delhez, University of Liège).

Co-lecturer at the IMAC XXXIV pre-conference course #104 on *Theoretical and Experimental Modal Analysis of Nonlinear Mechanical Systems*, 2016.

Invited presentations and papers

1. Invited seminar at the Zienkiewicz Centre for Computational Engineering (ZC2E), at Swansea University, Feb. 15 2017.
2. Invited presentation at the *6th International Conference on Nonlinear Vibrations, Localization and Energy Transfer* that will be held in Belgium in July 2016.
3. *"Control-based continuation: bifurcation and stability analysis for physical experiments": invited talk at the EquaDiff Conference, Lyon, 2015.*
4. *"Testing of a Spacecraft Structure with Non-Smooth Nonlinearities": invited talk at the SIAM Dynamical Systems Conference, Snowbird, 2015.*
5. *"Design and Performance of a Nonlinear Tuned Vibration Absorber": an invited talk at the University of Bristol Dynamics and Control Group seminars, Bristol, Dec. 2014.*
6. *"Natural frequencies and normal modes of nonlinear aerospace structures": invited talk at ASME Turbo Expo session "Efficient Dynamic Analysis of Nonlinear Structures", Düsseldorf, 2014.*
7. *"An effective finite-element-based method for the computation of nonlinear normal modes of nonconservative systems": invited paper in the Meccanica Special Issue "Nonlinear Dynamics and Control of Composites for Smart Engi. Design", 2014.*

Journal publications

Accepted & Published

1. **L. Renson**, D.A.W. Barton, S.A. Neild, Experimental Tracking of Limit-point Bifurcations and Backbone Curves using Control-based Continuation, International Journal of Bifurcation and Chaos, in press.
2. G. Cirillo, A. Mauroy, **L. Renson**, G. Kerschen, R. Sepulchre. A spectral characterization of nonlinear normal modes, Journal of Sound and Vibration 377:284-301, 2016.
3. **L. Renson**, A. Gonzalez-Buelga, D.A.W. Barton, S.A. Neild, Robust identification of backbone curves using control-based continuation, Journal of Sound and Vibration 367:145-158, 2016.
4. **L. Renson**, G. Kerschen, B. Cochelin. Numerical Computation of Nonlinear Normal Modes in Mechanical Engineering, Journal of Sound and Vibration 364:177-206, 2016.
5. J.P. Noël, **L. Renson**, C. Grappasonni, G. Kerschen. Identification of Nonlinear Normal Modes of Engineering Structures under Broadband Forcing, Mechanical Systems and Signal Processing 74:95-110, 2016.
6. **L. Renson**, J.P. Noël, G. Kerschen. Complex dynamics of a nonlinear aerospace structure: numerical continuation and normal modes, Nonlinear Dynamics 79(2): 1293-1309, 2015.
7. T. Detroux, **L. Renson**, L. Masset, G. Kerschen. The harmonic balance method for bifurcation analysis of large-scale nonlinear mechanical systems, Computer Methods in Applied Mechanics and Engineering 296:18-38, 2015.

8. R. J. Kuether, **L. Renson**, T. Detroux, C. Grappasonni, G. Kerschen, M. S. Allen. Nonlinear Normal Modes, Modal Interactions and Isolated Resonance Curves, Journal of Sound and Vibration, 351(0): 299-310, 2015.
9. J.P. Noël, **L. Renson**, G. Kerschen. Complex dynamics of a nonlinear aerospace structure: experimental identification and modal interactions, Journal of Sound and Vibration, 333(12): 2588-2607, 2014.
10. **L. Renson**, G. Deliége and G. Kerschen. An effective finite-element-based method for the computation of nonlinear normal modes of nonconservative systems, Meccanica, 49(8): 1901-1916, 2014.

In preparation & under review
11. C. Sombroek, P. Tiso, **L. Renson**, G. Kerschen. Nonlinear normal mode computation using modal-derivatives reduction basis, in review (2017).

Presentations and publications in conference proceedings
I have more than 30 conference publications and presentations in 17 different conferences with topics ranging from mechanical engineering to nonlinear applied mathematics. A selection of papers and talks is given below:
1. **L. Renson**, J.P. Noel, D.A.W. Barton, S.A. Neild, G. Kerschen. Nonlinear Phase Separation Testing of an Experimental Wing-Engine Structure. Proceedings of the International Modal Analysis Conference (IMAC) XXXV, Orange County, CA, USA, 2017.
2. M. Song, **L. Renson**, J.P. Noel, B. Moaveni, G. Kerschen. Bayesian FE Model Updating Using Nonlinear Normal Modes: Application to a Cantilever Beam. Proceedings of the International Modal Analysis Conference (IMAC) XXXV, Orange County, CA, USA, 2017.
3. **L. Renson**, D. A. Ehrhardt, D. A. W. Barton, S. A. Neild, and J. E. Cooper. Connecting nonlinear normal modes to the forced response of a geometric nonlinear structure with closely spaced modes, Proceedings of the ISMA 2016 conference, Leuven, Belgium, 2016.
4. **L. Renson**, D.A.W. Barton, S.A. Neild. Experimental analysis of a softening-hardening nonlinear oscillator using control-based continuation. Proceedings of the International Modal Analysis Conference (IMAC) XXXIV, Orlando, USA, 2016.
5. D.A.W. Barton, **L. Renson**. Control-based continuation: bifurcation and stability analysis for physical experiments. EquaDiff Conference, Lyon, 2015.
6. **L. Renson**, J.P. Noel, G. Kerschen. Testing of a Spacecraft Structure with Non-Smooth Nonlinearities, SIAM Dynamical Systems Conference, Snowbird, 2015.
7. R. J. Kuether, **L. Renson**, T. Detroux, C. Grappasonni, G. Kerschen, M. S. Allen. Prediction of Isolated Resonance Curves using Nonlinear Normal Modes. *Proceedings of the ASME 2015 International Design Engineering Technical Conferences (IDETC) and Computers and Information in Engineering Conference (CIE)*, 2015.
8. M. Song, **L. Renson**, J.P. Noël, M. Babak, G. Kerschen. Nonlinear model updating by means of identified nonlinear normal modes. Presented at the Engineering Mechanics Institute Conference, Palo Alto (Stanford), 2015.
9. C. Sombroek, **L. Renson**, P. Tiso, G. Kerschen. Bridging the gap between Nonlinear Normal Modes and Modal Derivatives. *Proceedings of the International Modal Analysis Conference (IMAC) XXXIII*, 2015.
10. **L. Renson**, J.P. Noël, G. Kerschen. Experimental evidence and numerical prediction of nonlinear modal interactions in a real-life aerospace structure. *Proceedings of the ISMA 2014 conference*, Leuven, Belgium, 2014.
11. **L. Renson**, C. Touzé, G. Kerschen. Computation of damped nonlinear normal modes with internal resonances: a boundary value approach, *Proceedings of the 8th European Nonlinear Dynamics Conference (ENOC 2014)*, 2014.
12. **L. Renson**, J.P. Noël, G. Kerschen. Dynamics of a Strongly Nonlinear Spacecraft Structure Part II: Modal Analysis, *Proceedings of the 13th European Conference on Spacecraft Structures, Materials & Environmental Testing*, 2014.
13. T. Detroux, **L. Renson**, G. Kerschen. The harmonic balance method for advanced analysis and design of nonlinear mechanical systems. *Proceedings of the SEM IMAC XXXII*, 2014.
14. **L. Renson**, G. Kerschen. Numerical computation of nonlinear normal modes of nonconservative systems. *Proceedings of the ASME 2013 International Design Engineering Technical Conferences*

(IDETC) and Computers and Information in Engineering Conference (CIE), 2013.

15. **L. Renson**, G. Kerschen. A new computational method for nonlinear normal modes of nonconservative systems. *Proceedings of the Euromech Colloquium n. 541, New Advances in the Nonlinear Dynamics and Control of Composites for Smart Engineering Design, 2013.*

16. **L. Renson**, G. Kerschen. Computation of nonlinear normal modes through continuation methods. *Paper presented at International School and Workshop on Advanced Computational and Experimental Techniques in Nonlinear Dynamics*, Cusco, Peru, 2013.

17. J.P. Noël, **L. Renson**, G. Kerschen, B. Peeters, S. Manzato, J. Debille. Nonlinear dynamic analysis of an F-16 aircraft using GVT data. *Proceedings of the International Forum on Aeroelasticity and Structural Dynamics,* 2013.

18. **L. Renson**, G. Deliège, G. Kerschen. Finite element computation of nonlinear normal modes of nonconservative systems. *Proceedings of the ISMA 2012 conference*, 2012.

19. **L. Renson**, F. Blanc, C. Touzé, G. Kerschen. Transport Methods for the Numerical Computation of Nonlinear Normal Modes. *Paper presented at 4th International Conference on Localization, Energy Transfer and Nonlinear Normal Modes in Mechanics and Physics*, Haifa, Israel, 2012.

20. A. Cammarano, A. Carrella, **L. Renson**, G. Kerschen. Identifying and computing nonlinear normal modes. *Proceedings of the International Modal Analysis Conference (IMAC) XXX*, 2012.

21. **L. Renson**, G. Kerschen, A. Newerla. Nonlinear modal analysis of the SmallSat spacecraft. *Proceedings of the International Modal Analysis Conference (IMAC) XXX*, 2012.

22. **L. Renson**, G. Kerschen. Comparison between a finite-element-based and a trajectory-based method for computing damped nonlinear normal modes. *Paper presented at 5th International Conference on Localization, Energy Transfer and Nonlinear Normal Modes in Mechanics and Physics – NV2014*, Istanbul, Turkey, 2014.

23. **L. Renson**, G. Deliège, L. Noels, G. Kerschen. Finite Element Computation of Nonlinear Normal Modes. *Paper presented at Fifth International Conference on Advanced COmputational Methods in Engineering,* Liège, Belgium, 2011.