Adrien Mélot

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Personal website | Scholar profile | ResearchGate profile | ORCID profile

Research interests

Nonlinear Dynamics – Numerical analysis – Rotordynamics

Education

Ecole Centrale de Lyon Lyon, France
PhD in Nonlinear Dynamics April 2019 – May 2022

CentraleSupélec Paris, France
MSc in Computational Mechanics Sept. 2017 – Oct. 2018

ISAE-Supméca – Institut Supérieur de Mécanique de Paris Paris, France
"Diplôme d'ingénieur" – MSc in Mechanical Eng. Sept. 2015 – Oct. 2018

Research experience

Optimization of nonlinear mechanical systems with bifurcating behaviour
Statistical Inference for Structural Health Monitoring Team Inria Rennes
Academic Visitor in the Dynamics group Imperial College London
Supervisors: Dr E. Denimal - Dr L. Renson Dec. 2022 – Present
Responsible for the development of a mathematical and computational framework to optimize the bifurcation structure of nonlinear mechanical systems.
Keywords: Bifurcation Analysis, Optimization, Reduced-Order Modelling, Global and Local Nonlinearities

Computational nonlinear dynamics of large-scale geared systems
Laboratoire de Tribologie et Dynamique des Systèmes Ecole Centrale Lyon
Supervisors: Dr E. Rigaud - Dr J. Perret-Liaudet Apr. 2019 – Sept. 2022
Responsible for the development and implementation of computational methods to carry out nonlinear dynamic analyses of large-scale geared systems subjected to multi-harmonic excitations.
Keywords: Nonlinear Gear Dynamics, Harmonic Balance Method, Bifurcation Analysis, Contact Modelling, Reduced-Order Modelling

Modal analysis of rotating structures with digital image correlation
Vibration University Technology Centre Imperial College London
Supervisor: Dr C. W. Schwingshackl Aug. 2016 – Feb. 2017
Responsible for the development of a new contactless technique to carry out modal analysis on rotating structures. The proposed methodology was used to study the effect of Coriolis forces on the dynamics of a bladed disk. Findings were in good agreement with strain gauges results and numerical simulations.
Keywords: Bladed Disks, Digital Image Correlation, Modal Analysis

Student supervision

Internship supervisor, LTDS (Ecole Centrale Lyon) Summer 2021
Nonlinear modal analysis of gear transmissions

Project supervisor, LTDS (Ecole Centrale Lyon) Spring 2021
Sound synthesis of gear rattle noise (two students)

Teaching experience

Teaching assistant, INSA Rennes Spring 2023
Strength of materials (28h)
Teach students key mechanical properties of materials, stress-strain relationship, static behaviour of beams under axial and transverse loads

Teaching assistant, Ecole Centrale Lyon Fall 2020
Introduction to nonlinear vibrations (2h)
Teach students key concepts in nonlinear dynamics (Stability, bifurcations, Poincaré sections)

Teaching assistant, Ecole Centrale Lyon 2019-2020
Numerical modelling (30h)
Teach students basic knowledge of CAD and Finite Element Analysis, application to the design of flywheels

Industry experience

Safran Aircraft Engines Fan and LP compressor R&D dept. Paris, France
Internship Apr. 2018 – Oct. 2018
Modelling and analysis of a 3D multi-shaft bladed rotor with planetary gearbox
Keywords: Rotordynamics, Bladed Disks, Geared Rotor, Multistage Cyclic Symmetry

Skills

Programming
Proficient in: Matlab, Julia.
Familiar with: C, Python.

Finite element analysis/Computer-aided design
Proficient in: ANSYS, Catia.
Familiar with: Abaqus, SAMCEF, SimScale, Onshape.

Languages
French (fluent), English (fluent)

Publications

A. Mélot, E. Rigaud, J. Perret-Liaudet. **Robust design of vibro-impacting geared systems with uncertain tooth profile modifications via bifurcation tracking**. *International Journal of Non-Linear Mechanics*, 149 :104336, 2023.

A. Mélot, J. Perret-Liaudet, E. Rigaud. **Vibro-impact dynamics of large-scale geared systems**. *Nonlinear Dynamics* (111), 4959-4976, 2023.

A. Mélot, E. Rigaud, J. Perret-Liaudet. **Bifurcation tracking of geared systems with parameter-dependent internal excitation**. *Nonlinear Dynamics* (107), 413-431, 2022.

A. Mélot, Y. Benaïcha, E. Rigaud, J. Perret-Liaudet, F. Thouverez. **Effect of gear topology discontinuities on the nonlinear dynamic response of a multi-degree-of-freedom gear train**. *Journal of Sound and Vibration*, 516 :116495, 2022.

Y. Benaïcha, A. Mélot, E. Rigaud, J-D. Beley, F. Thouverez, J. Perret-Liaudet. **A decomposition method for the fast computation of the transmission error of gears with holes**. *Journal of Sound and Vibration*, 532 :116927, 2022.

H. André, Q. Leclère, D. Anastasio, Y. Benaïcha, K. Billon, M. Birem, F. Bonnardot, Z.Y. Chin, F. Combet, P.J. Daems, A.P. Daga, R. De Geest, B. Elyousfi, J. Griffaton, K. Gryllias, Y. Hawwari, J. Helsen, F. Lacaz, L. Laroche, X. Li, C. Liu, A. Mauricio, A. Mélot, A. Ompusunggu, G. Paillot, S. Passos, C. Peeters, M. Perez, J. QI, E.F. Sierra-Alonso, W.A. Smith, X. Thomas. **Using a smartphone camera to analyse rotating and vibrating systems: Feedback on the SURVISHNO 2019 contest**. *Mechanical Systems and Signal Processing*, 154 :107553, 2021.

Communications at refereed conferences

A. Mélot, E. Denimal, L. Renson. **Parametric optimization of fold bifurcation points**. *3rd International Nonlinear Dynamics Conference*, Rome, Italy, 2023.

A. Mélot, Y. Benaïcha, E. Rigaud, J. Perret-Liaudet. **Influence of gear topology discontinuities on the nonlinear dynamic response of a gear train subjected to multiharmonic parametric excitation**. *10th European Nonlinear Dynamics Conference*, Lyon, France, 2022.

A. Mélot, E. Rigaud, J. Perret-Liaudet. **Nonlinear parametric analysis of geared systems: a bifurcation tracking approach**. *11th European Solid Mechanics Conference*, Galway, Ireland, 2022.

A. Mélot, E. Rigaud, J. Perret-Liaudet. **Suivi de bifurcations pour l'analyse paramétrique des transmissions par engrenages**. *15ème Colloque National en Calcul des Structures*, Giens, France, 2022.

Talks and seminars

Computational methods for bifurcation analysis and control Apr. 2023

Invited seminar, Inria/CMAP, Ecole Polytechnique, Paris, France

Nonlinear dynamics of gear transmissions Jun. 2021
Invited seminar at a meeting of the industrial consortium CIRTRANS.

Periodic solutions of vibro-impacting systems Dec. 2019
LTDS seminar, Ecole Centrale Lyon, Lyon, France

Modal analysis of rotating structures with DIC Apr. 2017
Invited seminar, Quartz laboratory, ISAE-Supméca, Paris, France

Responsibilities

Reviewer for Journal of Sound and Vibration	2022 – Present
Reviewer for Nonlinear Dynamics	2022 – Present
Reviewer for Applied Mathematical Modelling	2021 – Present
Member-elect of the laboratory council	Apr. 2021 – Sept. 2022

Professional memberships

Member of International Society of Nonlinear Dynamics	2023 – Present
Member of GDR EX-MODELI	2023 – Present
Member of Computational Structural Mechanics Association	2022 – Present