

# Adrien Mélot

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## 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

Supervisors: Dr E. Denimal

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, 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	<b>Internship supervisor, LTDS (Ecole Centrale Lyon)</b> Nonlinear modal analysis of gear transmissions	Summer 2021
	<b>Project supervisor, LTDS (Ecole Centrale Lyon)</b> Sound synthesis of gear rattle noise (two students)	Spring 2021
Teaching experience	<b>Teaching assistant, Ecole Centrale Lyon (Dept. of Mech. Eng.)</b> Fall 2020 Introduction to nonlinear vibrations (2h) Teach students key concepts in nonlinear dynamics (Stability, bifurcations, Poincaré sections)	
	<b>Teaching assistant, Ecole Centrale Lyon (Dept. of Mech. Eng.)</b> 2019-2020 Numerical modelling (30h) Teach students basic knowledge of CAD and Finite Element Analysis, application to the design of flywheels	
Industry experience	<b>Safran Aircraft Engines</b> 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 <b>Keywords:</b> Rotordynamics, Bladed Disks, Geared Rotor, Multistage Cyclic Symmetry	
Skills	<b>Programming</b> Proficient in: Matlab, Python. Familiar with: C, Julia.	
	<b>Finite element analysis/Computer-aided design</b> Proficient in: ANSYS, SAMCEF, SimScale, Catia, Onshape. Familiar with: Abaqus.	
	<b>Languages</b> French (fluent), English (fluent)	
Publications	<u>A. Mélot</u> , E. Rigaud, J. Perret-Liaudet. <b>Robust design of vibro-impacting geared systems with uncertain tooth profile modifications via bifurcation tracking.</b> <i>International Journal of Non-Linear Mechanics</i> , 2023.	
	<u>A. Mélot</u> , J. Perret-Liaudet, E. Rigaud. <b>Vibro-impact dynamics of large-scale geared systems.</b> <i>Nonlinear Dynamics</i> , 2023.	
	<u>A. Mélot</u> , E. Rigaud, J. Perret-Liaudet. <b>Bifurcation tracking of geared systems with parameter-dependent internal excitation.</b> <i>Nonlinear Dynamics</i> (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 smart-phone camera to analyse rotating and vibrating systems: Feedback on the SURVISHNO 2019 contest.** *Mechanical Systems and Signal Processing*, 154 :107553, 2021.

#### Talks and tutorials

**Influence of gear topology discontinuities on the nonlinear dynamic response of a gear train subjected to multiharmonic parametric excitation** July 2022  
10th European Nonlinear Dynamics Conference, Lyon, France

**Nonlinear parametric analysis of geared systems: a bifurcation tracking approach** July 2022  
11th European Solid Mechanics Conference, Galway, Ireland

**Suivi de bifurcations pour l'analyse paramétrique des transmissions par engrenages** May 2022  
15ème Colloque National en Calcul des Structures, Giens, France

**Nonlinear dynamics of gear transmissions** Jun. 2021  
Talk 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  
Quartz laboratory seminar, 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