Guillaume Delay

Currently PhD student in Applied Mathematics (updated on the 08–JAN–2018)

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Research Interests

I am interested in studying the links between the exact and approached systems that occur when discretizing an infinite dimensional problem. I want to investigate the numerical approximation in several kind of problem, for instance in control theory. My research project focuses mainly on scientific computing and numerical analysis.

PhD thesis

title *Analysis of a fluid–structure stabilization problem*

supervisors Michel Fournié, Ghislain Haine, Sylvain Ervedoza

description I investigate the feedback stabilization of a fluid–structure problem. I first model a fluid–structure system that corresponds to a wing airfoil in a wind tunnel and find a feedback law that stabilizes small enough initial perturbations of this system. Then I study its discretization with an adapted Finite Element Method. I prove that the same feedback control law also stabilizes the discretized system.

Submitted articles (available on my homepage)

- Existence of strong solutions to a fluid–structure system with a structure given by a finite number of parameters, 24 p.

Educational Background

2015–2018 **PhD Thesis**, *Institut de Mathématiques de Toulouse*, Toulouse (France).
Analysis of a fluid–structure stabilization problem, Defense expected in June 2018

2015 **MSc in Applied Mathematics**, *Université Paul Sabatier (UPS in the sequel)*, Toulouse.

2011–2015 **MEng in Aerospace (Supaéro)**, *Institut Supérieur de l'Aéronautique et de l'Espace (ISAE in the sequel)*, Toulouse.
Options in the last year: 'Applied Mathematics' and 'Structure'.
One year in an Erasmus exchange with the University of Bristol (UK) (2013–2014).

2012 **BSc in Fundamental Mathematics**, *Université Paul Sabatier*, Toulouse.

2009–2011 **Preparatory Classes**, *Lycée Bellevue*, Toulouse.
National preparatory program for entrance into French state run graduate schools of Engineering, focused on Mathematics and Physics.

Master Courses (2014–2015)

Applied Mathematics (ISAE, Head Professor: Denis Matignon)

- **Introduction to High Performance Computing (OpenMP, MPI, CUDA)**, prof: Pierre Siron (ISAE), Régine Leconte (ISAE), mark: 17
- **Hierarchy of models for multi–scale and multi–physics problems**, prof: Claudia Nagulescu (UPS), mark: 18
- **Numerical Methods for Engineering**, prof: Michel Salaün (ISAE), François Rogier (ONERA), mark: 19.5
- **Advanced tools for Partial Differential Equations**, prof: François Rogier (ONERA), Guillaume Dufour (ONERA), mark: 16.5
- **Multi–purpose optimization and inverse problems**, prof: Régis Duvigneau (INRIA), Jean–Antoine Désidéri (INRIA), Pierre Maréchal (ISAE), mark: 14.5
- **Robust Design**, prof: Olivier Thual (CERFACS), Pierre Weiss (UPS), Nabil Rachdi (Airbus–IW), Fabien Mangeant (Airbus–IW), mark: 16

Structures (ISAE, Head Professor: Joseph Morlier)

- **Advanced Structures Dynamics**, prof: Alain Girard (ISAE), mark: 16
- **Finite Elements computations for mechanical problems**, prof: Joseph Morlier (ISAE), Michel Mahé (Airbus), mark: 16.5
- **Materials**, prof: Philippe Lours (Mines Albi), Thierry Ansart (DGA–CEAT), mark: 11.5
- **Special Materials**, prof: Christophe Bouvet (ISAE), mark: 16
- **Aircraft Loading**, prof: Robert Finance (ISAE), mark: 13.5
- **Aircraft Structures**, prof: Jean–Marie Fehrenbach (ISAE), mark: 16
- **Satellites Structures**, prof: Aurélien Hot (CNES), mark: 18.5
- **Introduction to Rocket Technology**, prof: Marc Montagne (Airbus–DS), mark: 16.5
- **Design for Composite Structures**, prof: Christophe Bouvet (ISAE), mark: 15.3
- **Structures Optimization**, prof: Joseph Morlier (ISAE), Mohamed Bouhlel (ONERA), mark: 19

MSc courses (UPS, Head Professor: Mihai Maris)

- **Introduction to Partial Differential Equations**, prof: Jean–Pierre Raymond (UPS), Jean–Michel Roquejoffre (UPS), mark: 10.5
- **Boundary Value Problems for Hyperbolic and Dispersive PDEs**, prof: Christophe Besse (UPS), Pascal Noble (INSA), mark: 17
- **Inverse Problems and Control Issues for PDE**, prof: Sylvain Ervedoza (UPS), Jérémi Dardé (UPS), unmarked (followed as a PhD student in 2016).

Projects

2015 **A meta–material study for a panel under lightning strikes**.
Team: six people
Time: about 40 hours
Goal: to gauge the possibility of using meta–materials to handle lightning strikes on a composite panel

2014 **Design of a wind farm**.
Team: five people
Time: about 30 hours
Goal: to design a wind farm in order to optimize the power production

2013 **Implementation of a bot for the game 'Arimaa'**.
Team: alone
Time: about 60 hours
Language: C++

2013 **Implementation of a Peer to Peer Server**.
Team: six people
Time: about 30 hours
Language: JAVA

2012 **Study of a little rocket booster**.
Team: two people
Time: about 40 hours
Goal: to gauge the performances of a booster

Internships

May 2015–October 2015 **MSc Internship**, *Commissariat à l'énergie atomique (CEA)*, Bordeaux (France).
Scientific computing of the Euler equations using Finite Volumes

July 2012 **Internship**, *Mecasud*, Colomiers (France).
Working on steering compensators

Teaching Activities

2017 1^{st} year of Maths BSc, Maths Interactive lectures using remote controllers given to the students

2017 1^{st} year of Info BSc, Numerical Analysis and programming sessions

2016 1^{st} year of Maths BSc, Maths tutorials

2016 1^{st} year of Maths BSc, Linear algebra and functional analysis (courses + tutorials)

2015 1^{st} year of Maths BSc, Maths tutorials

Languages

French Native speaker

English Professional level (B2)

German Basics

Computer skills

Software Matlab, LaTeX, emacs

Programming languages C++, C, JAVA

Extra–curricular activities

- Chess (club level)
- Guitar