Olivier Mullier | Postdoctoral researcher

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Positions

Current position

ENSTA Paristech — **Palaiseau**

Postdoctoral research — *Since May, 2016*

- Subject : validated numerical integration with Runge Kutta methods and computation of the viability kernel of controlled dynamical systems;
- collaborator : Alexandre Chapoutot - ENSTA Paristech;
- keywords : validated numerical integration, interval analysis, affine arithmetic, viability kernel, reachability, Lyapunov functions.

Previous postions

Polytech' — **Orléans**

Postdoctoral research — *From April, 2015 to February, 2016*

- Subject : employability of students in earthscience;
- collaborators :
  - Estelle Courtial - Polytech' Orléans,
  - Christelle Garrouste - université Paris-Est Créteil (UPEC);
- keywords : modeling, discrete time dynamical systems, flatness of controlled systems, inner approximation, interval analysis, affine arithmetic.

ENSTA Paristech — **Palaiseau**

Postdoctoral research — *From December, 2014 to February, 2015*

- Subject : Computation of the local troncation error of Runge-Kutta methods for validated numerical integration;
- collaborator : Alexandre Chapoutot - ENSTA Paristech;
- keywods : validated numerical integration, Runge-Kutta methods, Butcher series, automatic differentiation.

Academic background

École Polytechnique — **Palaiseau**

PHD in computer science — *2014*

PHD thesis in computer science (section CNU 27) from École Polytechnique made at CEA (French comission to atomic energy) LIST DILS in the laboratory MéASI (Methods and analysis of interacting systems). Thesis defended the 7th of May, 2014.

- Title : *Inner approximation of the range of vector-valued functions*;
- funding : Digiteo DIM LSC project SANSCRIT, Inner approximation for static analysis and robust control;
- supervisor : Éric Goubault - École polytechnique;
- assistant supervisors :
  - Michel Kieffer - Supélec,
  - Sylvie Putot - École polytechnique;
- jury president : Michel Rueher - université Côte d'Azur, Polytech' Nice-Sophia;
- protactors :
  - Laurent Granvilliers - université de Nantes,
  - Luc Jaulin - ENSTA Bretagne;
- examiners :
  - Nathalie Revol - ENS Lyon,
  - Siegfried Rump - université de technologie d'Hambourg, université de Waseda.

Université de Nantes **Nantes**
MSC in computer science, specialty optimization in operation research (ORO) *2010*

- Msc thesis : Solving ordinary differential equation based constraints in the constraint programing framework (6 month internship at National Institute of Informatics (NII), Tokyo);
- supervisors :
  - Alexandre Goldsztejn - université de Nantes,
  - Hiroshi Hosobe - National Institute of Informatics (NII), Tokyo.

Université François Rabelais **Tours**
Bachelor degree in computer science *2007*

Université François Rabelais **Tours**
DEUG MIAS (mathématics, computer science and application to sciences) *2006*

Projects

- chair complex system engineering.
  - industrial consortium: Thalès, Dassault-Aviation, DCNS and DGA;
  - academic consortium: École polytechnique, ENSTA Paristech and Télécom Paristech;
  - subject : defining new formalisms and methods for analyse and verification of cyberphysical systems.
- project DGA MRIS : safety of complex robotic systems.
  - consortium : LIRMM, EMN, ENPC, ENSTA Bretagne, ENSTA Paristech, MBDA;
  - subject : definition of new methods to prove the correctness of path planning algorithm.
- project EDIFICE (labex Voltaire).
  - subject : CIPEGE tool (Centre International de Prospectives pour l'Emploi en Géosciences et Environnement).

Languages

French: Mother tongue

English: Fluent

Teaching

IN101: Algorithmique et programmation (16h - january 2013), ENSTA ParisTech

INF301: Introduction à l'informatique (40h - june 2013), École polytechnique

INF421: Les bases de la programmation et de l'algorithmique (40h - October 2013), École polytechnique

IN102: Programmation en langage C (12h - november 2016), ENSTA ParisTech

IN103: Système et programmation (12h - january 2017), ENSTA ParisTech

MATLAB: Introduction to matlab (6h - september 2017), ENSTA ParisTech

Publications

Journal

Olivier Mullier, Éric Goubault, Michel Kieffer, and Sylvie Putot. General inner approximation of vector-valued functions. *Reliable Computing*, 18:pp. 117–143, nov. 2013.

Olivier Mullier, Alexandre Chapoutot, and Julien Alexandre dit Sandretto. Validated computation of the local truncation error of runge-kutta methods with automatic differentiation. Submitted to *Optimization Methods and Software*, 2017.

Olivier Mullier and Estelle Courtial. Set-membership computation of admissible controls for trajectory tracking. *Reliable Computing*, 2017. Accepted, to appear.

Conference Talks

Alexandre Goldsztejn, Olivier Mullier, Damien Eveillard, and Hiroshi Hosobe. Including ordinary differential equations based constraints in the standard cp framework. *Principles and Practice of Constraint Programming–CP 2010*, pages 221–235, 2010.

Éric Goubault, Olivier Mullier, Michel Kieffer, and Sylvie Putot. Inner approximated reachability analysis. In *Proceedings of HSCC'14*, apr. 2014.

Julien Alexandre dit Sandretto, Alexandre Chapoutot, and Olivier Mullier. Tuning PI controller in non-linear uncertain closed-loop systems with interval analysis. In *2nd International Workshop on Synthesis of Complex Parameters (SynCoP'15)*, volume 44, pages 91–102, Dagstuhl, Germany, 2015.

Julien Alexandre dit Sandretto, Alexandre Chapoutot, and Olivier Mullier. Formal verification of robotic behaviors in presence of bounded uncertainties. In *proceedings of IEEE Robotic Computing (IRC)*. to be published, April 2017.

Seminaries

Alexandre Goldsztejn, Olivier Mullier, Damien Éveillard, and Hiroshi Hosobe. Including ordinary differential equations based constraints in the standard CP framework. In *Small Workshop on Interval Methods*, Nantes, France, June 15-16 2010.

Olivier Mullier. Under-approximation of the range of vector-valued functions extended, small workshop on interval methods. bourges. In *Small Workshop on Interval Methods*, Bourges, France, 2011.

Olivier Mullier. Under-approximation of the range of vector-valued functions having different dimensions for domain and codomain. Seminary 11371: Uncertainty modeling and analysis with intervals: Foundations, tools, applications. Dagstuhl, Germany., 2011.

Alexandre Chapoutot, Julien Alexandre dit Sandretto, and Olivier Mullier. Validated Explicit and Implicit Runge-Kutta Methods. In *Small Workshop on Interval Methods*, Prague, Czech Republic, June 2015.

Posters

Olivier Mullier, Alexandre Chapoutot, and Julien Alexandre dit Sandretto. Validated computation of the local truncation error of runge-kutta methods with automatic differentiation. In *AD2016 - 7th International Conference on Algorithmic Differentiation*, 2016.