

# Andrea Brugnoli

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## Education

### ISAE-Supaero

*PhD in Automatic Control*

**Toulouse**

*October 2017-October 2020*

A port-Hamiltonian formulation of flexible structures: modelling and symplectic finite element discretization.

Supervisors: Daniel Alazard, Valérie Pommier-Budinger and Denis Matignon

### Université Paris Saclay/ Supélec

*Research Master in automatics and image processing*

**Paris/Toulouse**

*2016–2017*

Courses: inverse problem, advanced dynamics of flexible structures, parameter estimation.

### ISAE-Supaero

*Double degree in aerospace and aeronautical engineering*

**Toulouse**

*2015–2017*

Specialisation in applied mathematics and advanced automatics: multidisciplinary optimisation, high performance computing, control of flexible structures.

### Politecnico di Milano

*Master in space engineering, 110/110 cum laude*

**Milan**

*2014–2017*

Courses: orbital mechanics, structural dynamics and control, thermochemical propulsion.

### Politecnico di Milano

*Mechanical Engineering Degree, 110/110 cum laude*

**Milan**

*2011–2014*

Courses: finite element method, mechanical vibrations, numerical methods for engineering.

## Experiences

### ITA-Instituto Tecnológico de Aeronáutica

*Visiting researcher*

**São José dos Campos**

*January 2019, 4 months*

Collaboration with Flavio Cardoso-Riberio on numerical methods for port-Hamiltonian systems.

### CNES-Centre des études spatiales

*Internship*

**Toulouse**

*2017, 6 months*

Analysis of dismissed satellites subjected to solar pressure to identify stable pointing configurations and periodical behaviours.

### ISAE-Supaero in partnership with LAAS

*Industrial and entrepreneurial project*

**Toulouse**

*2016, 5 months*

Intelligent teleoperations and optimal control for micro-drones systems (six people team).

### Politecnico di Milano in partnership with Danieli S.p.A

*Bachelor project*

**Milan**

*2014, 3 months*

Dynamics of a forging manipulator: kinematics modelisation and dynamic analysis. Our project was selected for a final presentation at Danieli.

## Languages

**Italian:** native speaker  
**English:** fluent (Toeic 965/990)  
**French:** fluent  
**Spanish:** intermediate  
**Brazilian portuguese:** intermediate

## Computer skills

**Softwares and platforms:** Simulink, Abaqus, Inventor, Solid Works, Labview  
**Languages:** Python (especially FEM librairies: FEniCS and Firedrake), Matlab, Java, C,  $\text{\LaTeX}$   
**OS:** Linux environment (Fedora, Ubuntu)

## References

### Denis Matignon

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### Paul Kotyzca

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### Daniel Alazard

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### Laurent Lefèvre

Laboratory for system conception and integration  
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## Publications

### International journal articles

- [1] A. Brugnoli, D. Alazard, V. Pommier-Budinger, and D. Matignon. Port-Hamiltonian formulation and symplectic discretization of plate models. Part I: Mindlin model for thick plates. *Applied Mathematical Modelling*, 75:940 – 960, Nov 2019. <https://doi.org/10.1016/j.apm.2019.04.035>.
- [2] A. Brugnoli, D. Alazard, V. Pommier-Budinger, and D. Matignon. Port-Hamiltonian formulation and symplectic discretization of plate models. Part II: Kirchhoff model for thin plates. *Applied Mathematical Modelling*, 75:961 – 981, Nov 2019. <https://doi.org/10.1016/j.apm.2019.04.036>.
- [3] A. Brugnoli, D. Alazard, V. Pommier-Budinger, and D. Matignon. Port-Hamiltonian flexible multibody dynamics. *Multibody System Dynamics*, 51(3):343–375, Mar 2021.
- [4] A. Brugnoli, D. Alazard, V. Pommier-Budinger, and D. Matignon. A port-Hamiltonian formulation of thermoelasticity and its mixed finite element discretization. *Journal of Thermal Stresses*, 2021. Accepted for publication.

### International conferences

- [5] A. Brugnoli, D. Alazard, V. Pommier-Budinger, and D. Matignon. Partitioned finite element method for the Mindlin plate as a port-Hamiltonian system. In *3rd IFAC Workshop on Control of Systems*

*Governed by Partial Differential Equations CPDE 2019*, pages 88 – 95, Oaxaca, MX, 2019. <https://doi.org/10.1016/j.ifacol.2019.08.016>.

- [6] A. Brugnoli, D. Alazard, V. Pommier-Budinger, and D. Matignon. Interconnection of the Kirchhoff plate within the port-Hamiltonian framework. In *Proceedings of the 59th IEEE Conference on Decision and Control*, Dec 2019.
- [7] F. L. Cardoso-Ribeiro, A. Brugnoli, D. Matignon, and L. Lefèvre. Port-Hamiltonian modeling, discretization and feedback control of a circular water tank. In *Proceedings of the 59th IEEE Conference on Decision and Control*, Dec 2019.
- [8] A. Brugnoli, F. L. Cardoso-Ribeiro, G. Haine, and P. Kotyzca. Partitioned finite element method for power-preserving structured discretization with mixed boundary conditions. Accepted for the 21st IFAC World congress, Jul 2020.
- [9] A. Brugnoli, D. Alazard, V. Pommier-Budinger, and D. Matignon. Structure-preserving discretization of port-Hamiltonian plate models. Accepted for the 24th International Symposium on Mathematical Theory of Networks and Systems, Aug 2021.

## Interests

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Tutor of mathematics and physics for bachelor students.

Lindy Hop, tennis, travelling, literature and cinema.