Mathilde Boissier

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Work Experiences

Nov.21- **STEEP, INRIA Grenoble Rhône-Alpes, (France)**.

Post doc "Enabling the usage of numerical MFA models within participative processes".

Nov.17-Dec.20 **CMAP, École Polytechnique/LURPA, ENS Paris-Saclay (France)**.

PhD "Coupling structural optimization and trajectory optimization methods in additive manufacturing", supervised by Pr. Allaire and Pr. Tournier and funded by the SOlution pour la Fabrication Industrielle Additive project [1,2,3].

Mar.17-Jul.17 **CMAP, École Polytechnique (France)**.

Research internship Research on how to include some regularity constraints on the shape resulting from topology optimization to facilitate the generation of scanning paths used for metallic additive manufacturing, supervised by Pr. Allaire.

Mar.16-Jul.16 **Mechanical Engineering, Lehigh University (PA, USA)**.

Research internship Propose a shape optimization method under shakedown constraints using direct methods, supervised by Pr. Vermaak [4,5]. Because the shakedown behavior is less demanding than the elastic behavior, the optimal structure weight is expected to be smaller in this new case.

Jun.15-Aug.15 **Hoare Lea Acoustics, Bristol (UK)**.

Engineering internship Create a software (now in use) to optimize the energy windfarms can produce on a site depending on their modes and under noise constraints. The project has been continued by the company's acoustics environmental team.

Education

2016-2017 **Université Pierre et Marie Curie, France**.

M.Sc. in "Mathématiques de la modélisation", major in Numerical Analysis of Partial Differential Equations

2013-2016 **École Polytechnique, France**.

Bachelor and Master of Science, major in Applied Mathematics and Mechanics

Publications

PhD Manuscript

Coupling structural optimization and trajectory optimization methods in additive manufacturing, M. Boissier, 2020.

Published and accepted papers

[2] **Time dependent scanning path optimization for the powder bed fusion additive manufacturing process**, *Computer-Aided Design, 142, 103122*, M.Boissier, G.Allaire, C.Tournier (2022), HAL preprint: hal-03202102.

[3] **Additive Manufacturing Scanning Paths Optimization Using Shape Optimization Tools**, *Structural and Multidisciplinry Optimization, 61, pp2437-2466*, M.Boissier, G.Allaire, C.Tournier (2020), HAL preprint: hal-02410481v2.

[4] **Elastoplastic topology optimization and cyclically loaded structures via direct methods for shakedown**, *Structural and Multidisciplinary Optimization, 64, pp 189–217* , M.Boissier, J.Deaton, P.Beran, N.Vermaak (2021), HAL preprint: hal-02935509.

[5] **Some Graphical Intepretation of Melan's Theorem for Shakedown Design**, *chapter in 'Advances in direct methods for material and structures'* , N.Vermaak, M.Boissier, L.Valdevit, R.M. McMeeking (2018).

Submitted papers

[1] **Concurrent shape optimization of the part and scanning path for powder bed fusion additive manufacturing**, *sumitted to SIAM Journal of Control and Optimization*, M.Boissier, G.Allaire, C.Tournier (2021), HAL preprint: hal-03124075v3.

Oral communications

Further details can be found at `mboissier.gitlab.io/publis.html`

- Shape optimisation under shakedown constraints, Top Webinar, online 2021 (November)
- Optimisation de trajectoire laser en fabrication additive, SMAI, La Grande Motte (France), 2021
- Coupling structural optimization and trajectory optimization methods in additive manufacturing, WCSMO 14, online 2021
- Coupling structural optimization and trajectory optimization methods in additive manufacturing, Top Webinar, online 2021 (April)
- Coupling structural optimization and trajectory optimization methods in additive manufacturing, 14th WCCM and ECCOMAS Congress, online 2021
- Couplage de méthodes d'optimisation de forme et de trajectoire en fabrication additive, Congrès d'Analyse Numérique pour les jeunes, online 2020
- Shape optimization under shakedown constraint, Workshop on the Intersection of Set-Valued Analysis, Plasticity, and Friction, online 2020
- Laser path optimization using shape optimization tools for the Laser Powder Bed Fusion process, Sim-AM, Pavia (Italy), 2019
- Laser path optimization for additive manufacturing, WCSMO, Beijing (China), 2019
- Optimisation de trajectoire pour le procédé de fabrication Laser Powder Bed Fusion, CSMA, Giens (France) 2019
- Towards elastoplastictopology optimization with direct methods, MOPTA Conference, Bethlehem (PA, USA), 2016

Poster communications

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- Path optimization for the laser powder bed fusion additive manufacturing, Special semester, workshop New trends in PDE constrained optimization, Linz (Austria), 2019
- Path optimization for the laser powder bed fusion additive manufacturing process, Workshop New trends and challenges in the mathematics of optimal design, Cambridge UK, 2019
- Couplage de méthodes d'optimisation topologique de formes et d'optimisation de trajectoires en fabrication additive, CANUM, Cap d'Agde (France) 2018
- Automated Optimization Method for Wind Farm Noise, WindEurope Conference, Hamburg (Germany) 2016 (presented by M. Cand)

Awards

- ISSMO/Springer 2019 prize for [3]

Teaching Experiences

Sep.17-Jun.19 **Teaching assistant**, *Introduction to Numerical Analysis*, Bachelor program, École Polytechnique.

Skills

- **Programming:** FreeFem, Python, Scilab, LaTeX
- **Languages:** French (native language), English (proficient), Spanish (working knowledge)

Volunteering Experiences

Mar.21-Nov.21 **Volunteering in the department "Écologie et Grande Pauvreté", ATD-Quart Monde**.

The objective of this department is to think about environmental issues and solutions together with people in position of insecurity. Indeed, they should not be collateral victims of environmental policies. On the contrary, they should be listened to as a source of inspiration, knowledge and proposition to make these issues an opportunity to improve the leaving conditions of each of us.

Mar.21-May.21 **Volunteering for the Shift Project**.

Participation in a project to determine local areas' resilience in the context of ecological and social transitions. I focused on the initiatives developed by the region Auvergne Rhône Alpes on biodiversity issues.

Nov.19-Jan.21 **Member of the Administrative Council, Climates France**.

Climates is an international organization aimed at empowering the youth on environmental issues. My role in the administrative council is to redesign the governance system to better coordinate the organization.

Oct.13-Apr.14 **Intern for Le Valdocco, Tassin-La-Demie-Lune, France**.

Worked part time as an educator in a centre for dropout teenagers, sent there by justice because of their school obligation, and part time as an animator with children to prevent them from dropping out school.