JOSEPH BRUNET

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EDUCATION

École des Mines de Saint-Étienne, France *Expected Mar. 2021*
Ph.D. candidate in Biomechanics

Paris Descartes University, France *Sep 2016 - Oct 2017*
Master of Science - MS, Biomedical Engineering - Major in Biomechanics

École Nationale Supérieure d'Arts et Métiers, France *Sep 2014 - Oct 2017*
Master's Degree in Mechanical Engineering

RESEARCH EXPERIENCE

PhD Researcher | École des Mines de Saint-Étienne, France *Nov 2017 - Present*
Funded by the European Research Council
Advisors: Pierre Badel, Éric Maire

Thesis: Understanding the mechanisms of aortic dissection: finite element modeling and in situ experimentation with X-ray tomography

- Collection and manipulation of arterial tissue from pigs and rabbits
- Tensile and peeling tests to assess the elastic and fracture properties of the tissue
- Development of a tension-inflation device fitting inside an X-ray tomography setup and its computer interface
- In situ 3D imaging of the dissection of pressurized arterial segments by X-ray microtomography
- Modeling of the observed failure phenomena using the extended finite element method

Research intern | Medtronic, France *Jul 2017 - Nov 2017*
Experimental and numerical study on meshes for abdominal hernia repair

- Uniaxial, biaxial, and indentation tests on different type of textiles
- Modeling the observed mesh behaviors with a nonlinear, anisotropic, plastic model

M.S. Researcher | École des Mines de Saint-Étienne, France *Jan 2017 - Jul 2017*
Advisor: Pierre Badel

Thesis: Investigation of shear delamination during rupture of arterial medial tissue using cohesive numerical model

PUBLICATIONS

Brunet, J., Pierrat, B., Badel, P. "A parametric study on factors influencing the onset and propagation of aortic dissection using the extended finite element method." IEEE. Trans. Biomed. Eng. (2020). Manuscript accepted.

Brunet, J., Pierrat, B., Adrien, J., Maire, E., Curt, N., Badel, P. "A Novel Method for In Vitro 3D Imaging of Dissecting Pressurized Arterial Segments Using X-Ray Microtomography." Exp. Mech. Sp Iss: Experimental Advances in Cardiovascular Biomechanics (2020).

Brunet, J., Pierrat, B. and Badel, P. "Review of current advances in the mechanical description and quantification of aortic dissection mechanisms." IEEE Rev. Biomed. Eng. (2020).

Brunet, J., Pierrat, B., Adrien, J., Maire, E., Badel, P. "A combined experimental-numerical lamellar-scale approach of tensile rupture in arterial medial tissue using X-ray tomography." J. Mech. Behav. Biomed. Mater." Vol. 95, pp. 116-123, (2019).

CONFERENCE PRESENTATIONS

Investigation of notch propagation in an in-vitro dissection model using X-ray microtomography. Oral presentation delivered at the **45th Congress of the Société de Biomécanique**, Online, October, 2020

A numerical design of experiment approach to understand aortic dissection onset and propagation. Oral presentation delivered at the **44th Congress of the Société de Biomécanique**, Poitiers, France, October, 2019

Chairman of the session "Macro-scale biofluids", **44th Congress of the Société de Biomécanique**, 2019 at University of Poitiers, France

A new approach combining experiment and numerical simulation using cohesive interface to model tensile failure in arterial medial tissue at the meso-scale. Poster presentation delivered at the **8th World Congress of Biomechanics**, Dublin, Ireland, July, 2018.

Characterization and modelling of rupture in arterial medial tissue under tension from in situ experiments with X-ray tomography. Oral presentation delivered at the **15th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering**, Lisbon, Portugal, March, 2018

TEACHING EXPERIENCE

Teaching Assistant, École des Mines de Saint-Étienne *2018 - 2020*
Courses: Experimental mechanics, Finite element method
Supervisor of master students - Industrial and research projects

Tutor for students in difficulty, Saint-Exupery middle school, Macon *2015 - 2016*
Courses: Mathematics and physics

ACADEMIC SERVICE

PhD student representative *2018 - 2020*
Board of the Doctoral School of Science, Engineering and Health of the University of Lyon

PhD student representative *2018 - 2020*
Board of SAINBIOSE laboratory (INSERM)

President of the Saint-Étienne Doctoral Students' Club *2018 - 2019*

REFERENCES

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