Curriculum Vitae – Paul Grandgeorge

1. Personal Information

Name: Paul Grandgeorge
Date of birth: 03-15-1991
Nationality: French-Dutch
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2. Research Experience

Oct. 2021 → Now

Post-doctoral Researcher – Roumeli Research Lab – Materials Sciences and Engineering (University of Washington) – Seattle, USA
Supervisor: Dr. Eleftheria Roumeli
Topics: *Fabrication of sustainable biologically-sourced materials with increased biodegradability*
I am currently working on the design and fabrication **bioplastics** from **renewable resources**. For example, I study bacteria-cellulose based membranes, 3D-printing of biological materials, and green cements through the incorporation of algae powders in cement mixes.

Mar. 2018 → Sept. 2021

Post-doctoral Researcher – Flexible Structures Laboratory (École Polytechnique Fédérale de Lausanne, EPFL) – Lausanne, Switzerland
Supervisor: Prof. Pedro M. Reis
Topics: *Mechanics of elastic filaments in frictional contact*
During my Post-doc at EPFL, I focused on the **mechanics** of **elastic knots** using state-of-the art mechanical experiments as well as precision 3D imaging tools (X-ray Micro-Tomography and 3D imaging processing). As a side project, I also collaborated with a team of chemists (LMOM - EPFL), studying the mechanics of carbon-loaded surfactants.

3. Education

Mar. 2015 → Feb. 2018

Ph.D. in Mechanics at the ∂'Alembert Institute (Sorbonne Université) – Paris, France
Supervisors: Prof. Sébastien Neukirch and Prof. Arnaud Antkowiak
Thesis title: *Elasto-capillarity in fibrous media for the creation of ultra-extensible objects*
During my Ph.D., I studied the **mechanics of elasto-capillarity induced deformations** of thin elastic fibers and fibrous membranes by wetting liquids. I have participated in several **international conferences**, supervised undergraduates in the laboratory and I have given several **mechanics classes as a Teaching Assistant**.

Mar. 2014 → Aug. 2014

R&D engineer at Electro-Medical Systems – 6 months internship – Nyon, Switzerland
Supervisors: Dr. Marcel Donnet (EMS) and Dr. Éric Boillat (LMTM – EPFL)
Topic: *Dental small-scale sandblast nozzle: Characterization and design*
Performance characterization and **protype fabriction** of dental sandblast nozzles.

Sept. 2009 → Aug. 2014	**BSc and MSc in Mechanical Engineering, École Polytechnique Fédérale de Lausanne (EPFL)– Lausanne, Switzerland** I graduated with a major in **Solid** and **Fluid Mechanics** and a minor in a **Conception**. I spent an exchange **Erasmus** year at the Universitat Politècnica de Catalunya, Barcelona, Spain. During my 3rd year, I was granted an **excellence scholarship** by EPFL.
2009	**French Baccalauréat with International Dutch option – Ferney-Voltaire, France** Equivalent grade A pass with honors (17.6/20 – "Mention très bien").

4. Published Articles in Peer-Reviewed International Journals

11 – E. Bomal, **P. Grandgeorge**, R. Yeo, N. Candau, P. M. Reis, and H. Frauenrath
Spontaneous Formation of a Self-Healing Carbon Nanoskin at the Liquid-Liquid Interface
Nature Communications, *in press* (2022)

10 – J. L. Fredricks, M. Parker, **P. Grandgeorge**, A. M. Jimenez, E. Law, M. Nelsen, and E. Roumeli
The effects of temperature, pressure, and time on lignin incorporation in bacterial cellulose materials
MRS Communications (2022)

9 – **P. Grandgeorge**, T. G. Sano, and P. M. Reis
An elastic rod in frictional contact with a rigid cylinder
Journal of the Mechanics and Physics of Solids, **164** (2022) 104885

8 – T. G. Sano, P. Johanns, **P. Grandgeorge**, C. Baek, and P. M. Reis
Exploring the inner workings of the clove hitch knot
Extreme Mechanics Letters, **55** (2022) 101788

7 – **P. Grandgeorge**, C. Baek, H. Singh, P. Johanns, T. G. Sano, A. Flynn, J. H. Maddocks, and P. M. Reis
Mechanics of two filaments in tight orthogonal contact
Proceedings of the National Academy of Science - USA, **118**(15) (2021) e2021684118

6 – P. Johanns, **P. Grandgeorge**, C. Baek, T. G. Sano, J. H. Maddocks, and P. M. Reis
The shapes of physical trefoil knots
Extreme Mechanics Letters, **43** (2021) 101172

5 – C. Baek, P. Johanns, T. G. Sano, **P. Grandgeorge**, and P. M. Reis
Finite Element Modeling of Tight Elastic Knots
Journal of Applied Mechanics, **88**(2) (2021) 024501

4 – **P. Grandgeorge**, N. Krins, A. Hourlier-Fargette, C. Laberty-Robert, S. Neukirch, and A. Antkowiak
Capillarity-induced folds fuel extreme shape changes in thin wicked membranes
Science, **360** (2018), 296-299

3 – D. Moulton, **P. Grandgeorge**, S. Neukirch
Stable elastic knots with no self-contact
Journal of the Mechanics and Physics of Solids, **116** (2018), 33-53

2 – **P. Grandgeorge**, A. Antkowiak, and S. Neukirch
Auxiliary soft beam for the amplification of the elasto-capillary coiling: towards stretchable electronics
Advances in Colloids and Interfaces, **255** (2018), 2-9

1 – H. Elettro, **P. Grandgeorge**, and S. Neukich
Elastocapillary coiling of an elastic rod inside a drop

Journal of Elasticity, **127** (2017), 235-247

5. Published Articles in a National Journal

1 – **P. Grandgeorge**, S. Neukirch, A. Antkowiak
Une fibre auxiliaire souple pour l'enroulement élasto-capillaire d'une fibre fonctionnelle dure
Comptes-rendus de la rencontre du non-linéaire (2017)

6. Invited Seminars

(Virtual) Seminar at Université de Marseilles, Irphé, Marseilles (France) – *2021*
Load Transmission Along Elastic Rods in Frictional Contact

(Virtual) Seminar at the Rencontres du Non-linéaire (RNL), Workshop: Elasticity and Geometry, Paris (France) – *2021*
Load Transmission Along Elastic Rods in Frictional Contact

Seminar at CentraleSupélec, MSSMat Laboratory, Paris (France) – *2020*
Mechanics of knots: study of two elastic rods in frictional contact

Seminar at the ∂'Alembert Institute, Sorbonne Université, Paris (France) – *2020*
Mécanique des nœuds : Étude expérimentale de tiges élastiques entrelacées

Seminar at the AS2M Laboratory, femto-st, Besançon (France) – *2018*
Elasto-capillary coiling and wrinkling of fibers and fibrous membranes in wetting liquids

7. Contributed Seminars

American Physical Society March Meeting – Online meeting – *2021*
Load Transmission along an Elastic Rod in Frictional Contact with a Rigid Cylinder

Society of Engineering Science (SES), Virtual Technical Meeting – *2020*
Filaments in tight contact: the clasp of elastic rods

Congrès Français de Mécanique, 24$^{\text{ème}}$ édition, Brest, France – *2019*
Mécanique des nœuds: étude expérimentale de tiges élastiques entrelacées

American Physical Society March Meeting, Boston, USA – *2019*
Friction in knots – clasps as a building block for elastic knots

Research group (GDR) MECAFIB (Multiscale dynamics of fibrous media), Nancy, France – *2018*
Étude expérimentale de la mécanique de nœuds élastiques

Society of Engineering Science (SES) 55$^{\text{th}}$ Annual Technical Meeting, Madrid, Spain – *2018*
From knots to not-knots – Mechanics of the elastic orthogonal clasp

European Solid Mechanics Conference (ESMC) 10$^{\text{th}}$ Meeting, Bologna, Italy – *2018*
Wicked membrane - elasto-capillary buckling of a thin fibrous membrane for the design of strechable fabrics

Society of Engineering Science (SES) 54$^{\text{th}}$ Annual Technical Meeting, Boston, USA – *2017*
Self-assembled surface reservoirs for ultra-stretchable membranes

Rencontres du Non-Linéaire (RNL), Paris, France – *2017*
Une fibre auxiliaire souple pour l'enroulement élasto-capillaire de fibre fonctionnelles dures

Euromech Colloquium 569: Multiscale Modeling of Textile and Fibrous Materials, Châtenay-

Malabry, France – *2016*
Liquid wires – fiber coiling inside a droplet provides highly compressible device

MicroMast: 1st International Conference on Multiscale Applications of Surface Tension, Bruxelles, Belgium – *2016*
Liquid wires – coiling rigid microfibers inside liquid droplets

Rencontres du Non-Linéaire (RNL), Paris, France – *2016*
Enroulement élasto-capillaire pour la création de fibres ultra-extensibles x

8. Public Outreach and Scientific Vulgarization

Presentation of the Roumeli Laboratory's research activities – *2022*
Outreach for the students of the Chief Leschi High School, Puyallup WA

Presentation of the Flexible Structure Laboratory's research activities – *2019*
EPFL open days (Event organized for families and high school students)

Tech24 - Scientific vulgarization show on the channel France24 – *2018*
Ultra-stretchable membrane using elasto-capillary interactions

Experimental conference at the "Espace Pierre-Gilles de Gennes" at ESPCI, Paris (France) – *2016*
Spider capture silk: sticky, liquid and solid at the same time (in French)

French Scientific vulgarization TV-Show "E=M6" – *2016*
Hommes vs. animaux: le match (in French)

9. Patent

Composite Membrane and Method for Manufacturing Such a Membrane
Patent filed on march 10, 2017 – ref. FR1751950 (US patent US20200010989A1)
Authors: Arnaud Antkowiak, Paul Grandgeorge, Natacha Krins and Christel Laberty-Robert

10. Prizes and Awards

Best article prize in physics awarded by the magazine "La Recherche" – *2018*
For the article: Grandgeorge et al., Capillarity-induced folds fuel extreme shape changes in thin wicked membranes, Science, 2018.

Laureate of the LUTECH 2018 Trophy awarded by the Technology Acceleration and Transfer Society SATT-Lutech – *2018*
For our team's investment during the technological maturation process of the fibers and membrane elasto-capilarity project.

Excellence Fellowship awarded by EPFL at the end of my Bachelor – *2012*
Awarded to "students with outstanding academic records".

11. Teaching Experience

Introduction to Material Science (1st year undergrad) – *Winter & spring quarters – 2022*
Professor: Dr. E. Roumeli (ref. University of Washington – ENG-202)
10 hours of lab and theoretical classes

Introduction to Structural Mechanics (1st year undergrad) – *Springs 2019 – 2020 – 2021*
Professor: Pedro M. Reis (ref. EPFL – ME-104)
60 hours of lecture material preparation (class demonstrations to illustrate statics concepts)

Mechanics of Slender Structures (Master's degree) – *Falls 2019 – 2020*
Professor: Pedro M. Reis (ref. EPFL – ME-411)
30 hours of lecture material preparation (class demonstrations and exercises)

Fluid flows and waves (3rd year undergrad) – *2015-2018*
Professors: Anne Mongruel and Régis Wunenburger (ref. Sorbonne Université-Mécanique 3A101)
64 hours of theoretical exercises + **28 hours** of practical exercises

Introduction to continuum mechanics (3rd year undergrad) – *2015-2017*
Professor: Anne Sergent (ref. Sorbonne Université-Mécanique 3A004)
36 hours of practical exercises

Project in numerical methods (2nd year undergrad) – *2015-2016*
Professor: Mouaouia Firdaous (ref. Sorbonne Université-Mécanique 3A104)
14 hours of practical exercises

Statics and dynamics of fluids (2nd year undergrad) – *2015-2017*
Professors: Cédric Croizet and José Fullana (ref. Sorbonne Université-Mécanique 2A004)
32 hours of practical exercises

Introduction to Engineering Mechanics (1st year undergrad) – *2012*
Professors: Daniel Kremer and Claude Ramseyer (Laboratory LCSM – EPFL)
24 hours of theoretical exercises

12. Supervision of Junior Researchers

Hareesh Iyer – Master's thesis at the Roumeli Lab (UW) – *Oct. 2021 → Jun. 2022*
Effects of Thermomechanical Processing Conditions on the Morphology and Mechanical Properties of Spirulina Bioplastics

Chelsea Ho – Undergraduate Senior thesis at the Roumeli Lab (UW) – *Oct. 2021 → Jun. 2022*
The Processing and Characterization of Matcha Powder Foams

Paul Johanns – Ph.D. Student at the Flexible Structures Laboratory (EPFL) – *Mar. 2018 → Sept. 2021*
Technical and general mentoring during his Ph.D. thesis on the mechanics of knots

Nicolas Minazzo – Master 1st year semester project (EPFL) – 6 months – *2020*
Experimental and numerical investigation of the flow hydrodynamics in a knotted tube

Caroline Gay – Master's research internship (ESPCI) – 3 months – *2019*
Volumetric imaging of elastic knots through X-ray tomography

Ken van Meter – Master 1st year Mechanics internship (Sorbonne Université) – 3 months – *2018*
Hydrodynamic viscous dissipation around a rigid fiber

Anton Mladenov – 3rd year Bachelor Internship (ENS-Cachan) – 1 month – *2017*
Viscous dissipation during the unwinding of elasto-capillary pre-coiled elastic fibers

Florian Poydenot – 3rd year Bachelor Internship (ENS-Ulm) – 1 month – *2017*
Liquid-infused fibrous membrane for deployable electronics

Julien Froustey – 3rd year Bachelor Internship (ENS-Ulm) – 1 month – *2016*
Quasi-static force measurements of the elasto-capillary coiling drop-on-a-fiber system

Manon Lestimé – Master 1st year Mechanics internship (Sorbonne Université) – 3 months – *2016*
Viscous dissipation of the elasto-capillary coiling of elastic fibers in liquid droplets

13. Community Involvments

Weekly group meetings administrative organizer at the Flexible Structures Laboratory, EPFL – *2019-2020*

Representative member of the PhD students, at the Council of the ∂'Alembert Institute (Sorbonne Université) – *2016-2017*

Experimental group meetings organizer, monthly meeting between the experimentalists of the ∂'Alembert Institute (Sorbonne Université) – *2015-2017*

14. Skills

Languages
Fluently spoken and written: French, Dutch, Spanish, English
Intermediate level: Italian, Catalan

Experimental skills
Thermogravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC), 3D X-ray tomography, fast imaging techniques, 3D printing, polymer synthesis, mechanical testing, nanoindentation, laser cutting, milling, lathing

Informatics skills
Matlab, Python, Labview, FEM (Abaqus), Illustrator, Catia V5, Fusion 360, ImageJ, ffmpeg, Surface Evolver, LaTeX, Blender

15. Hobbies

During my free time, I enjoy practicing **squash** and **salsa dancing**. I also love **theater acting**, **hikes** and **bike rides** in nature.