

Jean-François Louf

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Professional position

Assistant Professor, Chemical Engineering department, Auburn University
Aug. 2021 – ongoing: Nature-Inspired Fluids and Elasticity lab (NIFE lab)

Education and Training

Post-Doctoral Associate, Chemical and Biological Engineering department, Princeton University
Jun. 2019 – Jul. 2021: Studied flow in poroelastic materials (hydrogels) and in human lungs with **Sujit S. Datta**

Post-Doctoral Associate, Physics department, Technical University of Denmark (DTU)
Feb. 2018 – Jan. 2019: Modeled and measured flow through soft pores with **Kaare H. Jensen**

Post-Doctoral Associate, Laboratory of Interdisciplinary Physics (LiPhy), University Grenoble Alpes
Feb. 2017 – Jan. 2018: Used microfabrication and microfluidics to design carriers for drug delivery with **Philippe Marmottant**

Post-Doctoral Associate, Biomedical and Mechanical Engineering Department, Virginia Tech
Jan. 2016 – Dec. 2016: Studied water entry dynamics of objects, and mechanical resistance of biological systems under stress (plants) with **Sunny Jung**

Ph.D. in Mechanics and Physics of Fluids, Jan. 2016

Poroelastic couplings and hydraulic signals in plants : a biomimetic approach.
Aix-Marseille University, Marseille, France

M.S. in Mechanical Engineering, Claude Bernard University, Lyon, France, Sep. 2012

B.S. in Physics, University of Nice Sophia-Antipolis, Nice, France, Jun. 2010

Peer-reviewed publications

(11 published. 9 first author, 2 second author)

* indicates equal contributors

- 11- Under Review**, *impact factor: -*
"Microbial narrow-escape is facilitated by wall interactions", M. Souzy*, A. Allard*, **JF. Louf**, M. Contino, I. Tuval, and M. Polin
- 10- Soft Matter**, 17, 3840 - 3847 (2021), *impact factor: 3.4*
"Poroelastic shape relaxation of hydrogel particles", **JF. Louf** and S.S. Datta
- 9- Science Advances**, 7:eabd2711 (2021), *impact factor: 13.1*
"Under pressure: Mechanics of swelling hydrogels under confinement", **JF. Louf**, N.B. Lu, M.G. O'Connell, H.J. Cho, and S.S. Datta
- 8- Physical Review Research**, 2, 043382 (2020), *impact factor: -*
"Elasto-capillary network model of inhalation", **JF. Louf***, F. Kratz*, and S.S. Datta
- 7- Physical Review Letters**, 125, 098101 (2020), *impact factor: 8.4*
"Bending and Stretching of Soft Pores Enable Passive Control of Fluid Flow", **JF. Louf**, J. Knoblauch, and K. H. Jensen
- 6- Journal of The Royal Society Interface**, 16, 20180690 (2019), *impact factor: 3.2*
"Drying of channels by evaporation through a permeable medium", B. Dollet, **JF. Louf**, M. Alonzo, K. H. Jensen, and P. Marmottant
- 5- Scientific Reports**, 8, 16314 (2018), *impact factor: 4.0*
"How wind drives the correlation between leaf shape and mechanical properties", **JF. Louf**, L. Nelson, H. Kang, P. Ntoh Song, T. Zehnbaauer, and S. Jung
- 4- Physical Review E**, 98, 042403 (2018), *impact factor: 2.3*
"Imbibition in plant seeds", **JF. Louf***, Y. Zheng*, A. Kumar, T. Bohr, C. Gundlach, J. Harholt, H. Friis Poulsen, and K. H. Jensen
- 3- Journal of Fluid Mechanics**, 850, 611-623 (2018), *impact factor: 3.4*
"Ripple dynamics of water entry after pinch off", **JF. Louf**, B. Chang, J. Eshraghi, A. Mituniewicz, P. Vlachos, and S. Jung

- 2- **Advanced Material Interfaces**, 1800425 (2018), *impact factor: 6.1*
 "Hovering Microswimmers Exhibit Ultra-Fast Motion to Navigate under acoustic forces", **JF. Louf**, N. Bertin, B. Dollet, O. Stephan, and P. Marmottant
- 1- **Proceedings of the National Academy of Sciences**, 114, 11034-11039 (2017), *impact factor: 9.4*
 "A universal mechanism for hydraulic signals in plants", **JF. Louf**, G. Guéna, É. Badel, and Y. Forterre

Patent

SHApE RELaxation (SHARE): A method to characterize the poroelastic properties of swellable soft materials
 S.S. Datta and JF. Louf, Provisional patent application filed

Grant Proposals

(7 contributions: 4 awarded, 1 under review)

- 7- **Defense Advanced Research Projects Agency**, \$1,500,000. POWER: Phase Optimal Water ExtRaction - Under review. Lead PI: Meggers, F.
- 6- **National Science Foundation**, \$250,000. Multiscale Biomechanical Modeling of Respiration and Respiratory Distress - not funded. PI: Datta, S.S.
- 5- **Andlinger E-ffiliates, Princeton University**, \$150,000. Atmospheric Water Harvesting Using Moisture-Absorbent Temperature-Controlled Hydrogels (MATCHes) - **Awarded** in 2019. Lead PI: Datta, S.S.
- 4- **USDA NIFA**, \$498,708. Liberation and Dispersal of Wheat Pathogens by Rain Splash and Jumping-Droplet Condensation - **Awarded** in 2018, PIs: Schmale, D.G., Jung, S, and Boreyko, J.
- 3- **Industry**, \$150,000. Bubbles and acoustic forces to clean surfaces - not funded 2016. PI: Jung, S.
- 2- **European Research Council - PLANTMOVE**, €1,933,996. Plant movements and mechano-perception: from biophysics to biomimetics - **Awarded** in 2015. PI: Forterre, Y.
- 1- **Agence Nationale de la Recherche - ARTIS**, €140,000. Poroelastic couplings in artificial and real plant tissues - **Awarded** in 2013. PI: Guéna, G.

Invited or selected oral presentations

University of Pennsylvania, Department of Physics and Astronomy, Invited talk in E. Katifori's group, Nov 2019
 "Poroelastic hydrogel membranes for flow control in plants", JF. Louf

Temple University, Department of Biology, Invited Department Seminar, Nov 2019
 "Fluid and Elasticity couplings for biology", JF. Louf

9th international plant biomechanics conference 2018

"Fluid dynamics of cytoplasmic mixing: from biomimetic aphids to rheology", JF. Louf, J. Knoblauch and K. H. Jensen

University Grenoble-Alpes, Laboratory of Interdisciplinary Physics (LiPhy), Invited talk, Jan. 2017

"Fluid-Elasticity couplings in plants and bubbles", JF. Louf

Fluid & Elasticity 2015

"Poroelastic coupling in natural and synthetic branches: relation with plant mechano-perception", JF. Louf, G. Guéna, É. Badel and Y. Forterre

Condensed Matter Days 2014

"Non-linear poro-elastic coupling in real and artificial branches and its possible link to plant mechano-perception", JF. Louf, G. Guéna, Y. Forterre, É. Badel, B. Moullia

National French Institute of Agronomy, Invited talk, Jun. 2014, laboratory of Physics and Integrative Physiology of Fruit Trees

"Hydraulic pulse induced by bending in synthetic and natural branches : role in plant mechano-perception", JF. Louf, G. Guéna and Y. Forterre

Meeting of Non-Linear Physics 2014

"Non-linear poroelastic coupling in plants", JF. Louf, G. Guéna, O. Pouliquen, Y. Forterre and É. Badel, H. Cochard, B. Moullia

Honors and Awards

Laboratory of Excellence PhD Fellowship, *Labex-Mec Aix-Marseille University*, Oct. 2012

Best Poster Award, *GDR BOIS (research group on wood)*, Paris, France, Nov. 2013

Best Poster Award, *7th Plant Biomechanics International Conference*, Clermont-Ferrand, France, Aug. 2012

Outreach

Article featured in CNRS journal, *Communication in plants: a new mechanism based on water*, Oct. 2017

Video interview by ElveFlow, *GDR Microfluidic (research group on micro-fluidic)*, Jul. 2017