

## 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

\* indicates equal contributors

**12- Bioinspiration & Biomimetics**, 18, 015002 (2023), *impact factor: 2.9*  
"Poroelastic plant-inspired structures & materials to sense, regulate flow, and move", **JF. Louf** and S. Alexander

**11- Physical Review Research**, 4, L022029 (2022), *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

**Bioinspired Pressure Pulse Mechanosensing: A Smart Skin Leveraging Poroelasticity to Impart Mechanosensitivity to Prosthetics** JF. Louf and Tofayel Ahammad Ovee, Provisional patent application filed on 11/08/22

**SHApe RELaxation (SHARE): A method to characterize the poroelastic properties of swellable soft materials** S.S. Datta and JF. Louf, Provisional patent application filed on 01/04/21

## Grant Proposals

(15 contributions: 5 awarded, 3 pending)

16- NSF/ANR, \$1,000,839.85. Sweet Buzz: Physical and Molecular basis for nectar sugar content optimization in flowers by airborne acoustic signals - pending, PIs: Louf, JF. and Peaucelle, A.

15- ACS PRF, \$110,000 direct cost. Freezing of polymer solution droplets - pending, PI: Louf, JF.

14- NIH DP2, \$1,499,726.71 direct cost. Plant-Inspired Soft Skin for Mechanosensing Prosthetics - pending, PI: Louf, JF.

13- NSF STTR, \$225,000. Symbiotic seed treatment solutions for crop biofertilization - pending, PIs: Noel, Z., Liles, M., Sanz Saez de Jauregui, A., Bashan, L., Alexander, S., and Louf, JF.

12- FFAR, \$457,664. Evaluation of sustainable pectin-based seed treatment formulation for enhancements of Bacillus for crop stress tolerance and disease resistance - not funded, PIs: Noel, Z., Liles, M., Sanz Saez de Jauregui, A., and Louf, JF.

11- Alabama Farmers Cotton Committee 2022, \$19,000. Hydrogel seed coatings for cotton seeds to promote growth - not funded. Lead PI: Louf, JF.

**10- Alabama Farmers Federation's Soybean Committee 2022**, \$10,000. Hydrogel seed coatings for soy seeds to promote growth - **awarded**. Lead PI: Louf, JF.

9- Alabama Farmers Federation's Wheat & Feed Grain Committee 2022, \$17,000. Hydrogel seed coatings for wheat seeds to promote growth - not funded. Lead PI: Louf, JF.

8- ORAU Ralph E. Powe Junior Faculty Enhancement Awards, \$10,000. Plant-inspired mechanosensitive soft robot - not funded. Lead PI: Louf, JF.

7- Defense Advanced Research Projects Agency, \$1,500,000. POWER: Phase Optimal Water ExtRaction - not funded. 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-affiliates, 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

**INRAE Versailles, Plant Biology and Breeding department, Invited Department Seminar, Apr 2022**

"Fluid and Elasticity Couplings in Plants and Hydrogels", JF. Louf

**University Lyon I, Fluid Mechanics and Acoustics Laboratory, Invited Department Seminar, Apr 2022**

"Fluid and Elasticity Couplings in Plants and Hydrogels", JF. Louf

**Georgia Tech, Department of Biology, Invited Department Seminar, Feb 2022**

"Poroelastic couplings in Plants and Hydrogels: From Mechanoperception to Higher Crop Yields", JF. Louf

**Auburn University, Department of Entomology and Plant Pathology, Invited Department Seminar, Jan 2022**

"Fluids and Elasticity couplings in plants", JF. Louf

**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 Department Seminar, 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. Moulia

### **National French Institute of Agronomy, Invited Department Seminar, 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. Moulia

## Professional Activities and Service

### Referee for journals

Nature Communication, Frontiers in Plant Science, Water, Advanced Function Materials, Microfluidics and Nanofluidics, Physical Review Fluids, Journal of Fluid Mechanics

### Organizer/chair of sessions at scientific meetings

"Thin Films, Confinement, and Interfaces" session, AIChE Annual Meeting, 2022

"Porous Media Flows: Convection and Heat Transfer I" session, APS DFD, 2021

"Biological Fluid Dynamics: Respiratory Flows I" session, APS DFD, 2019

### Thesis Committees

2021-present: Pravin Parasakthi, ChemE (PhD student); advisor Bryan Beckingham

2021-present: Ayuba Akinpelu, ChemE (PhD student); advisor Panagiotis Mistrionis

2020-present: Akhil Teja Kambhampati, MechE (PhD student); advisor Mark Hoffman

### Service at Auburn University

Graduate Research Engineering Showcase, Poster judge, Oct. 2021, 2022

Graduate Admissions Committee, Academic Year 2022-2023, 2023-2024

## Awards/Honors to Advisees Based on Work Under my Advisement

Honorable Mention Poster Award, *Tofayel Ahammad Ovee*, 10th Graduate Engineering Research Showcase, Auburn University, Oct. 2022

## Outreach

**Journal Club for October 2022 on iMecanica.org:** A Mechanical Approach to Shape, Flow, and Mechanoperception in Plants, Sep. 2022

**Science Fair Judge**, Mar. 2022

**E-day open house**, Feb. 2022

**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