Jean-François Louf

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Professional position

Assistant Professor, ***Chemical Engineering department***, Auburn University
Aug. 2021 – ongoing: Natured-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

15- Soft Matter, *DOI: 10.1039/D3SM01470C (2024)* *impact factor: 4.0*
"Obstructed swelling and fracture of hydrogels", A. Plummer*, C. Adkins*, **JF. Louf**, A. Kosmrlj, and S.S. Datta

14- Langmuir, *DOI:10.1021/acs.langmuir.3c02243 (2024),* *impact factor: 4.3*
"Unidirection freezing of polymer solution droplets", S. Kharal and **JF. Louf**

13- Soft Matter, *DOI: 10.1039/D3SM00465A (2023)* *impact factor: 4.0*
"An energy-optimization method to study gel-swelling in confinement", J. Chatainya, M. Giso, **JF. Louf**, S.S. Datta, and T.J. Atherton

12- Bioinspiration & Biomimetics, *18, 015002 (2022),* *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: 4.2*
"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: 4.0*
"Poroelastic shape relaxation of hydrogel particles", **JF. Louf** and S.S. Datta

9- Science Advances,*7:eabd2711 (2021),* *impact factor: 14.1*
"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: 4.2*
"Elasto-capillary network model of inhalation", **JF. Louf***, F. Kratz*, and S.S. Datta

7- Physical Review Letters, *125, 098101 (2020),* *impact factor: 9.1*
"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: 4.2*
"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: 4.9*
"How wind drives the correlation between leaf shape and mechanical properties", **JF. Louf**, L. Nelson, H. Kang, P. Ntoh Song, T. Zehnbauer, and S. Jung

4- Physical Review E, *98, 042403 (2018),* *impact factor: 2.7*
"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: 4.2*
"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: 6.3*
"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: 12.7*
"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 01/31/23

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

4- NSF-ANR, $986,820. NSF-ANR MCB/PHY: Physical and Molecular basis for nectar sugar content optimization in flowers by airborne acoustic signals - pending, **PI: Louf, JF.**, co-PI: Peaucelle, A.

3- NSF MRI, $1,378,700. MRI Track I: Acquisition of a cryo-FESEM - pending, **PI: Louf, JF.**, co-Pis: Reed, M., Beckingham, L., Beckingham, B., Moss, A.

2- ACS PRF DNI, $110,000. Freezing of polymer solution droplets - 07/2024-08/2026, **PI: Louf, JF.**

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

Invited or selected oral presentations

Auburn University, Plant Seminar Series, Invited Department Seminar, September 2023
"A dance of forces: Using sound and confinement to manipulate root gravitropism, hydraulic redistribution, and Physarum growth", JF. Louf

International Soft Matter Conference 2023
"Unidirectional Freezing of Polymer Solution Droplets", JF. Louf

University of Liege, Physics department, Invited Department Seminar, May 2023
"Freezing and sensing: polymer use from cryopreservation to soft robotics", JF. Louf

University of Oxford, Mechanical Engineering department, Invited Department Seminar, May 2023
"Hydrogel swelling, drying, and relaxing in a stressful environment", JF. Louf

Cambridge Partner Design Biomedical Engineering Seminar, Apr. 2023
"Freezing and Sensing: polymer use from cryopreservation to soft robotics", JF. Louf

University of Texas at Austin, Center for Nonlinear Dynamics, Invited Department Seminar, Apr. 2023
"Freezing and Sensing: polymer use from cryopreservation to soft robotics", JF. Louf

Seoul National University, Mechanical Engineering department, Invited Department Seminar, Mar 2023
"Drying, Bending, and Freezing of Hydrogels", JF. Louf

INRAE Versailles, Plant Biology and Breading 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 poroelastic 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 Institue 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

Awards

American Chemical Society PRF DNI award

Referee for journals

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

Grant Proposal reviewer

NSF reviewer, 2024

Organizer/chair of sessions at scientific meetings

Session Co-Organizer: MS04 "Swelling and shrinking porous media" session, Interpore, 2024

Session Co-Organizer: "Plant and fungal physics" focus session, APS March Meeting, 2024

Session Co-Organizer: "Thin Films, Confinement, and Interfaces" session, AIChE Annual Meeting, 2023

Session Chair: "Swelling and shrinking in porous media" session, Interpore, 2023

Session Chair: "Swelling and shrinking in porous media" session, Interpore, 2022

Session Co-Organizer: "Thin Films, Confinement, and Interfaces" session, AIChE Annual Meeting, 2022

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

Session Chair: "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 Mistriotis

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

Service at Auburn University

Tenure Track Faculty Hiring Committee, Academic Year 2023-2024

Graduate Research Engineering Showcase, Poster judge, Fall 2021, Fall 2022, Fall 2023

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

Awards/Honors to Advisees Based on Work Under my Advisement

Undergrad Finalist for the "AUsome Science in 60 seconds competition", *Joshua Green*, Auburn University, Spring 2023

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

Outreach

Mentoring High-School student Mentored a high school student for a week to let her see what is a research lab, Summer 2023

Engineering Summer expo Designed hands-on experiments and worked with K-12 students visiting Auburn University (AU), Summer 2023

Member of the AU delegation to Korea Helped improve ties between AU and Korean Universities, Spring Break 2023

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, 2023

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*