

# Hervé Nganguia

Department of Mathematics  
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## Areas of Specialization & Interests

Data Science; Fluid Dynamics; Mathematical Biology; Mathematical Physics; Neural Networks

## Appointments held

2016-2018 Postdoctoral Research Fellow, Santa Clara University  
2018-2021 Assistant Professor, Indiana University of Pennsylvania  
2021-2024 Assistant Professor, Towson University  
2022-2024 Jess and Mildred Fisher Endowed Professor of Mathematics, Towson University  
2024- Associate Professor, Towson University

## Education

2003 BSc in Engineering Sciences, City University of New York - College of Staten Island  
2005 MSc in Biomedical Engineering, Columbia University in the City of New York  
2008 MSc in Applied Mathematics, San Diego State University  
2014 PhD in Mathematical Sciences, New Jersey Institute of Technology

## Grants, Honors & Awards

2021-2022 "Mathematics Enhances Teamwork in STEM (METinSTEM)", *FCSM General Endowment Funds*, Towson University, **\$3,240.00**  
2022-2024 "LEAPS-MPS: Mathematical Modeling of Targeted Drug Delivery: Unifying Lighthill and Taylor Theories", *LEAPS MPS-2211633*, National Science Foundation, **\$242,132.00**  
2022-2024 Jess and Mildred Fisher Endowed Chair in the Mathematical and Computing Sciences, *Fisher College of Sciences and Mathematics*, Towson University, **\$16,000.00**

## Scholarly Works (2017-)

### PEER-REVIEWED JOURNAL ARTICLES

2017 **H. Nganguia**, K. Pietrzyk, and O. S. Pak, "Swimming efficiency in a shear-thinning fluid", *Physical Review E*, 96:062606.  
2018 **H. Nganguia** and O. S. Pak, "Squirmer motion in a Brinkman medium", *Journal of Fluid Mechanics*, 855:554-573.  
2019a K. Pietrzyk, **H. Nganguia**, C. Datt, L. Zhu, G. Elfring, and O. S. Pak, "Flow around a squirmer

in a shear-thinning fluid", *Journal of Non-Newtonian Fluid Mechanics*, 268:101-110.

- 2019b **H. Nganguia**, O. S. Pak, and Y.-N. Young, "Effects of surfactant transport on electrodeformation of a viscous drop", *Physical Review E*, 99:063104.
- 2020a **H. Nganguia**, L. Zhu, D. Palaniappan, and O. S. Pak, "Squirming in a viscous fluid enclosed by a Brinkman medium", *Physical Review E*, 101:063105.
- 2020b **H. Nganguia**, K. Zheng, Y. Chen, O. S. Pak, and L. Zhu, "A note on a swirling squirmer in a shear-thinning fluid", *Physics of Fluids*, 32:111906.
- 2021a K. Qin, Y. Chen, Z. Peng, **H. Nganguia**, L. Zhu, and O. S. Pak, "Propulsion of an elastic filament in a shear-thinning fluid", *Soft Matter*, 17:3829.
- 2021b **H. Nganguia**, W.-F. Hu, M.-C. Lai, and Y.-N. Young, "Effects of surfactant solubility on the hydrodynamics of a viscous drop in a DC electric field", *Physical Review Fluids*, 6:064004.
- 2023a **H. Nganguia**, D. Das, O. S. Pak, and Y.-N. Young, "Influence of surface viscosities on the electrodeformation of a prolate viscous drop", *Soft Matter*, 19:776-789.
- 2023b J. Della-Giustina, **H. Nganguia**, and E. Demir, "Squirming with a backward-propelling droplet", *Physics of Fluids*, 35:051703.
- 2023c U. Aymen, D. Palaniappan, E. Demir, and **H. Nganguia**, "Influence of heterogeneity or shape on the locomotion of a caged squirmer", *Journal of Fluid Mechanics*, 967:A7.
- 2024a E. Demir, B. van Gogh, D. Palaniappan, and **H. Nganguia**, "The effect of particle geometry on squirming in a heterogeneous medium", *Journal of Fluid Mechanics*, 986:A20.
- 2024b **H. Nganguia** and D. Palaniappan, "Ciliary propulsion through nonuniform flows", *Journal of Fluid Mechanics*, 986:A14.

#### CONFERENCE MEETINGS

- 2017 "Swimming in a Brinkman Porous Medium at low Reynolds number", *American Physical Society 70th Annual Division of Fluid Dynamics Meeting*.
- 2018a "Electrohydrodynamics of Surfactant-laden Drops and Vesicles", *SIAM conference on the Life Sciences*.
- 2018b "Effects of Surfactant Transport on the Electro-Deformation of Viscous Drops", *American Physical Society 71st Annual Division of Fluid Dynamics Meeting*.
- 2018c "Swimming in a Two-Fluid Model", *American Physical Society 71st Annual Division of Fluid Dynamics Meeting*.
- 2019a "Electrohydrodynamics of Surfactant-Laden Drops", *American Physical Society March Meeting*.
- 2019b "Sorption-controlled electrohydrodynamics of a surfactant-covered viscous drop", *American Physical Society 72nd Annual Division of Fluid Dynamics Meeting*.
- 2020 "Effects of surfactant solubility on the hydrodynamics of a viscous drop in a dc electric field", *American Physical Society 73rd Annual Division of Fluid Dynamics Meeting*.
- 2021 "Swimming in a fluid pocket enclosed by a porous medium", *Society for Mathematical Biology*.
- 2022 "Electrohydrodynamics of drops with complex interfaces", *American Physical Society 75th Annual Division of Fluid Dynamics Meeting*.
- 2023a "The effects of heterogeneity on the propulsion of neutrobots: a minimal model", *American Physical Society March Meeting*.
- 2023b "The effect of particle geometry on squirming in a heterogeneous medium", *American Physical Society 76th Annual Division of Fluid Dynamics Meeting*.
- 2024 "Swimming through axisymmetric paraboloidal flows", *American Physical Society March Meeting*.

## Teaching

### TOWSON UNIVERSITY

2021-Present Calculus I/III; Differential Equations; Elementary Linear Algebra; Experimental Mathematics; Linear Algebra; Mathematical Models; Numerical Analysis I; Selected Topics in Mathematics; Special topics in Differential Equations and Optimization

### INDIANA UNIVERSITY OF PENNSYLVANIA

2018-2021 Applied Math for Business; Calculus I/II for Business, Natural, and Social Science; Elementary Functions; Introduction to Linear Algebra; Modeling and Simulation; Numerical Methods; Ordinary Differential Equations

### NEW JERSEY INSTITUTE OF TECHNOLOGY

2009-2014 Applied Numerical Methods; Calculus I/II; Methods of Applied Math I – Capstone

### SAN DIEGO STATE UNIVERSITY

2006-2009 Calculus for Business Analysis, Calculus for the Life Sciences I/II

## Mentoring

**Graduate students:** Ummul Aymen (Towson University, 2022-2023), James Della-Giustina (Towson University, 2022-2024), Omar Farooqui (Towson University, 2022-2023), William Hunter (Towson University, 2023-2024), Ryan Peters (Towson University, 2023-2024), Christelle Etaba (Towson University, 2024)

**Undergraduate students:** Kyle Pietrzyk (Santa Clara University, 2016-2018; PhD @ Stanford University), Brandon van Gogh (Santa Clara University, 2021-2022; PhD @ Stanford University), Adedoyin Adegbuyi (Towson University, 2022; MSc @ Johns Hopkins University), William Hunter (Towson University, 2022), Ifenyinwa Okeke (Towson University, 2022), Alex Holtzman (Towson University, 2023-2024), Mary Meloni (Towson University, 2023-2024), Geena Sarnoski (Towson University, 2023-2024), Jazmin Sharp (Towson University, 2023-2024), Efosa Owie (Towson University, 2024), Raphael Zeldin (Towson University, 2024)

## Institutional Service

**Department:** *Pure and Applied Mathematics Committee, APIM Graduate Committee, Postdoctoral Search Committee.*

**College:** *Associate Dean Search Committee, DEIJ Committee.*

## Service to the Profession

**Referee - Journals:** *Applied Sciences, Electronics, Energies, Fluid Dynamics Research, Journal of Biomechanics, Journal of Engineering Mathematics, Journal of Fluid Mechanics, Physics of Fluids, Rheologica Acta, Scientific Reports, Soft Matter.*

**Review panelist - Funding Agencies:** *National Science Foundation (2022).*