Amir A. Pahlavan

Contact Information

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Professional preparation

University of Tehran,
B.S., Mechanical Engineering, 2008.

University of Illinois at Urbana-Champaign,
M.S., Theoretical & Applied Mechanics, 2010,
Advisors: David Saintillan & Jonathan B. Freund.

Massachusetts Institute of Technology,
Ph.D., Mechanical Engineering, 2018,
Major: Soft Matter, Minor: Statistical Physics,
Advisors: Ruben Juanes & Gareth H. McKinley.

Princeton University,
Postdoctoral Researcher, Mechanical & Aerospace Engineering, 2018–June 2021,
Mentor: Howard A. Stone.

Appointments

Yale University,
Assistant Professor, Mechanical Engineering & Materials Science, July, 2021–present.
Affiliate Faculty, Integrated Graduate Program in Physical and Engineering Biology, 2021-present.
Affiliate Faculty, Wu Tsai Institute, 2022-present.

Selected Publications

(Under Review)

(* Corresponding author)

1. M. Alipour, Y. Li, H. Liu, **A. A. Pahlavan***, "Phoretic Migration and Disorder Shape the Macroscopic Transport and Dispersion of Colloids Across Porous Media", 2024.
2. H. Liu, **A. A. Pahlavan***, "Solute-Driven Colloidal Vortex Formation in a Microfluidic T-Junction", 2024.
3. Y. Qiu, L. Cueto-Felgueroso, **A. A. Pahlavan**, B. Primkulov, R. Juanes, "Phase-field modeling of two-phase displacement in a capillary tube", 2024.
4. S. McBride, S. Atis, **A. A. Pahlavan**, K. Varanasi, "Crystal Patterning from Aqueous Solutions via Solutal Instabilities", 2024.

(Published)

1. M. S. Yousafzai, S. Amiri, Z. G. Sun, **A. A. Pahlavan***, M. Murrell*, "Tissue Confinement Induces Retrograde Convective Cellular Flows", *Journal of the Royal Society Interface*, 2024.
2. D. Li, Z. Yang, **A. A. Pahlavan**, R. Zhang, R. Hu, and Y-F. Chen, "Stability transition in gap expansion-driven interfacial flow", *Physical Review Letters*, 2024.
3. P. R. Kaneelil, J. P. de Souza , G. Turk , **A. A. Pahlavan**, H. A. Stone, "Triboelectrically mediated self-assembly, trapping, and control of drops at an interface", *Soft Matter*, 2024.
4. J. L. Wilson, **A. A. Pahlavan**, M. A/ Erinin, C. Duprat, L. Deike, H. A. Stone, "Aerodynamic interactions of drops on parallel fibres", *Nature Physics*, 19, 1667–1672 (2023).
5. J. L. Wilson, **A. A. Pahlavan**, "How drops of liquid move along parallel fibres in a perpendicular airflow", *Nature Physics*, 19 (11), 1565-1566 (2023).

6. Y. Qiu, K. Xu, **A. A. Pahlavan**, R. Juanes, "Wetting transition and fluid trapping in a microfluidic fracture", *Proceedings of the National Academy of Sciences*, 120 (22) e2303515120 (2023).
7. Y. Li, Y. Chen, Y. Li, H. A. Stone, **A. A. Pahlavan***, and S. Granick, "Volatile Droplets on Water are Sculpted by Vigorous Marangoni-Driven Subphase Flow", *Langmuir*, (2023).
8. B. K. Primkulov, **A. A. Pahlavan**, L. Cueto-Felgueroso, R. Juanes, "Motion of a viscous slug on heterogeneous surfaces: crossover from stick–slip to steady sliding", *Journal of Fluid Mechanics*, 973, A2, (2023).
9. L. Yang, **A. A. Pahlavan**, H. A. Stone, C. D. Bain, "Evaporation of alcohol droplets on surfaces in moist air", *Proceedings of the National Academy of Sciences*, 120 (38), (2023).
10. Y. Li , **A. A. Pahlavan*** , Y. Chen , S. Liu , Y. Li , H. A Stone, S. Granick, "Oil-on-Water Droplets Faceted and Stabilized by Vortex Halos in the Subphase", *Proceedings of the National Academy of Sciences*, 120 (4) e2214657120, (2023).
11. M. A. Herrada, A. Ponce-Torres, P. R. Kaneelil, **A. A. Pahlavan**, H. A. Stone, and J. M. Montanero, "Effect of a soluble surfactant on the linear stability of two-phase flows in a finite-length channel", *Physical Review Fluids*, 7, 114003, (2022).
12. P. R. Kaneelil, **A. A. Pahlavan**, N. Xue, and H. A. Stone, "Three-dimensional self-similarity of coalescing viscous drops in the thin-film regime", *Physical Review Letters*, 129, 144501, (2022).
13. P. R. Kaneelil, **A. A. Pahlavan**, M. A. Herrada, K. LeRoy, K. Stengel, S. Warner, A. M. Galea, and H. A. Stone, "Symmetry breaking of a parallel two-phase flow in a finite length channel", *Physical Review Fluids*, 7, 033904, (2022).
14. B. K. Primkulov, **A. A. Pahlavan**, X. Fu, B. Zhao, C. W. MacMinn, R. Juanes, "Wettability and Lenormand's diagram", *Journal of Fluid Mechanics*, 923, A34, (2021).
15. P. de Anna, **A. A. Pahlavan**, Y. Yawata, R. Stocker, R. Juanes, "Chemotaxis under flow disorder shapes microbial dispersion in porous media", *Nature Physics*, 17, 68-73, (2021).
16. **A. A. Pahlavan**, L. Yang, C. D. Bain, H. A. Stone, "Evaporation of Binary-Mixture Liquid Droplets: The Formation of Picoliter Pancakelike Shapes ", *Physical Review Letters*, **127** 024501 (2021). ♣ (Editors' Suggestion)
17. F. Yang, **A. A. Pahlavan**, S. Mendez, M. Abkarian, H. A. Stone, " Towards improved social distancing guidelines: Space and time dependence of virus transmission from speech-driven aerosol transport between two individuals", *Physical Review Fluids (Rapid Communication)*, 5, 122501(R), 2020. ♣ (Editors' Suggestion)
18. N.B. Lu, **A. A. Pahlavan**, C.A. Browne, D.B. Amchin, H.A. Stone, and S.S. Datta, "Forced Imbibition in Stratified Porous Media", *Physical Review Applied*, 14, 054009, (2020).
19. B. K. Primkulov, J. Y. Y. Chui, **A. A. Pahlavan**, C. W. MacMinn, R. Juanes, "Characterizing Dissipation in Fluid-Fluid Displacement Using Constant-Rate Spontaneous Imbibition", *Physical Review Letters*, 125, 174503, (2020).
20. C. Kurzthaler, L. Zhu, **A. A. Pahlavan**, H. A. Stone, "Particle motion nearby rough surfaces", *Physical Review Fluids (Rapid Communication)*, 5, 082101(R), (2020).
21. B. K. Primkulov, **A. A. Pahlavan**, L. Bourouiba, J. W. M. Bush, R. Juanes, "Spin coating of capillary tubes", *Journal of Fluid Mechanics*, 886, A30, (2020).
22. **A. A. Pahlavan**, H. A. Stone, G. H. McKinley, R. Juanes, "Restoring universality to the pinchoff of a bubble", *Proceedings of National Academy of Sciences*, **116** 28 (2019).
♣ (Featured as Research Highlights by PNAS)
23. B. K. Primkulov, **A. A. Pahlavan**, X. Fu, B. Zhao, C. MacMinn, R. Juanes, "Signatures of fluid-fluid displacement in porous media: wettability, invasion events, patterns, and pressures", *Journal of Fluid Mechanics Rapids*, 875, R4, 2019.

24. **A. A. Pahlavan**, L. Cueto-Felgueroso, A. E. Hosoi, G. H. McKinley, R. Juanes, "Thin films in partial wetting: stability, dewetting, and coarsening", *Journal of Fluid Mechanics*, **845** 642 (2018).
25. B. Zhao, **A. A. Pahlavan**, L. Cueto-Felgueroso, R. Juanes, "Forced wetting transition and pinch off in a capillary tube", *Physical Review Letters*, **120** 084501 (2018).
26. **A. A. Pahlavan**, L. Cueto-Felgueroso, G. H. McKinley, & R. Juanes, "Thin films in partial wetting: internal selection of contact line dynamics", *Physical Review Letters*, **115** 034502 (2015).
♣ (Featured in "Research Highlights" as "Physics Focus" article by APS)
27. B. Ezhilan, **A. A. Pahlavan**, & D. Saintillan, "Chaotic dynamics and oxygen transport in thin films of aerotactic bacteria", *Physics of Fluids*, **24** 091701 (2012).
28. **A. A. Pahlavan** & J. B. Freund, "Effect of solid properties on slip at fluid–solid interfaces", *Physical Review E*, **83** 021602 (2011).
29. **A. A. Pahlavan** & D. Saintillan, "Instability regimes in flowing suspensions of swimming micro-organisms", *Physics of Fluids*, **23** 011901 (2011).

Synergistic Activities & Service

Teaching at Yale

- Spring 2024: MENG 363– Undergraduate-Fluid Mechanics and Thermodynamics Laboratory); 22 students.
- Fall 2023: ENAS 776– Undergraduate/Graduate-Fluid Mechanics of Natural Phenomena); 10 students.
Evaluated as "Very unique structure that needs to be seen more in this major. The class is taught by the professor who is EXTREMELY competent in all of these fields of research.", "The class has a wonderful structure that allows the students to dive into the topics that are really interesting to them.", "Amir Pahlavan is one of my favorite professors that I have had the delight of having during my time at Yale. He is incredibly knowledgeable about the subject matter and shows a genuine passion about what he does. He makes an effort to involve students that I think many engineering classes lack.", "Amir is an incredibly knowledgable and engaging professor. His ability to adapt and meet the level of the students in the class and consider their questions and perspectives is very impressive and effective.".
- Spring 2023: MENG 363– Undergraduate-Fluid Mechanics and Thermodynamics Laboratory); 27 students.
Evaluated as "this is by far the best overhaul of a course that was previously notorious for being one of the nightmare courses of the MENG department", "The lab was very engaging and more focused on the hands-on experience than correct results, which was very helpful for learning and applying the material."
- Spring 2022: MENG 389– Undergraduate-Level Fluid and Thermal Energy Science); 17 students.
Evaluated as "Prof. Pahlavan is easily one of the top 3 professors I have had in the department", "one of the best engineering professors at Yale", "very good engineering class".

Mentoring at Yale

- Haoyu Liu, MEMS PhD student, Sep 2021-present.
- Hobart Chen, MEMS PhD student, Sep 2022-present.
- Aditya Pujari, MEMS PhD student, Sep 2022-present.
- Yiran Li, MEMS PhD student, Sep 2023-present.
- Abhineet Rajput, MEMS PhD student, Sep 2023-present.
- Mobin Alipour, MEMS Postdoc (PhD Tu Wien), Feb 2022-present.
- Akash Ganesh, MEMS Postdoc (PhD Universite Paris Saclay), March 2023-present.
- Xiaolei Ma, MEMS Postdoc (PhD Emory University), March 2022-2023.
- Gavi Welbel, MEMS Undergraduate, Co-Advisor for Capstone Project, Sep 2022-2023.
- Yiran Li, Undergraduate Visiting Student from Tsinghua University, Aug 2022-Jan 2023.

- Pauline Moulliard, Visiting Graduate Student from UC Louvain, July-Aug 2022.
- Youri Marchal, Visiting Graduate Student from UC Louvain, July-Aug 2022.
- Emily Kang, Visiting REU Student from Amherst College, July-Aug 2022.
- Tanzila Alam, Yale Chemical Engineering Undergraduate Student, March-May 2022.

PhD Committees at Yale

- Marshall McCraw, Yale MEMS PhD student, Advisor: Corey O'Hern.
- Stephanie Woodman, Yale MEMS PhD student, Advisor: Rebecca Kramer-Bottiglio.
- Yitong Zheng, Yale MEMS PhD student, Advisor: Corey O'Hern.
- Shivnag Sista, Yale Physics PhD student, Advisor: Corey O'Hern.
- Yinsheng Lu, Yale MEMS PhD student, Advisor: Yibing Qyang.
- Medha Goyal, Yale MEMS PhD student, Advisor: Rebecca Kramer-Bottiglio.
- Abinish Dutta, Yale MEMS PhD student, Advisor: Jan Schroers.
- Sorosh Amiri, Yale MEMS PhD student, Advisor: Michael Murrell.
- Lam Vo, Yale QBio PhD student, Advisor: Thierry Emonet.
- Anjiabei Wang, Yale MEMS PhD student, Advisor: Ben Machta.

Service at Yale

- Organizer, Soft Fluid Living Matter (SoFLivMat) Coffee Hour Weekly Seminar Series, 2022-present.
- MEMS Graduate Admission Committee, 2021 and 2022.
- MEMS Junior Faculty Search, 2022 and 2023.
- Faculty Advisor, Yale Undergraduate Aerospace Association (YUAA), 2022–present.

Outreach Activities

- Yale Pathways to Science for Public High School Students, since 2021.
- New Haven Science Fair Family Night for Public Elementary School Students, Spring 2023.
- Open Labs at Yale for Public Elementary School Students (Virtual), Spring 2022.

Chair/Co-Chair of Scientific Meetings

- APS March Meeting, Minisymposium on Active Taxis in Dynamic Environments, 2025.
- APS March Meeting, Focus Session on Soft and Living Matter in Complex Environments, 2025.
- APS March Meeting, Focus Session on Soft and Living Matter in Geophysical Flows, 2024.
- APS DFD Meeting, Focus Session on Transport Phenomena in Active Biological Networks, 2022.
- Gordon Research Seminar on Flow in Permeable Media, 2022.
- APS March Meeting, Focus Session on Transport in Heterogeneous Environments, 2022.

Grant Proposal Reviewer

- DFG, German Research Foundation — Physics and Chemistry, 2023-present.
- Dutch Research Council (NWO) — Domain Applied and Engineering Sciences (AES), 2022-present.
- NSF Chemical Bioengineering Environmental and Transport Systems, 2022-present.
- Department of Energy, Basic Energy Sciences, 2022-present.
- ACS PRF Grant Program, 2021-present.
- Swiss National Science Foundation, Div. Mathematics, Physical and Engineering Sciences, 2020-present.
- National Science Foundation, Div. Earth Sciences, 2020-present.

Referee for Journals

Proceedings of National Academy of Sciences, Nature Communications, Physical Review Letters, Science Advances, Physical Review X, Physical Review Applied, Physical Review Fluids, Journal of Fluid Mechanics, Soft Matter, Physics of Fluids, ACS Applied Materials & Interfaces, Physical Review E, Microfluidics and Nanofluidics, Transport in Porous Media, Water Resources Research, Advances in Water Resources, Journal of Applied Mechanics, Chemical Engineering Science, AIChE

Journal, International Journal of Multiphase Flow, Applied Physics Letters.

Invited Talks (since 2021)

- Physical Math Seminar, MIT, Dec 2024.
- SAFL Seminar, University of Minnesota, Nov 2024.
- Banff (BIRS) Workshop on Non-Newtonian Flows in Porous Media, July 2024.
- Yale University Chemical and Environmental Engineering Department, April 2024.
- Tufts University Mechanical Engineering Colloquium, March 2024.
- APS March meeting session on Phase Separation in Active Matter, March 2024.
- Soft Materials Structures and Devices, Mechanical Engineering, MIT, Feb 2024.
- Civil and Environmental Engineering, University of Southern California, Nov 2023.
- Physics Colloquium, Wesleyan University, Nov 2023.
- Fluid Seminar, Brown University, Oct 2023.
- Porous Media Tea Time Talks, Online, Sep 2023.
- Physics Colloquium, Clark University, April 2023.
- 23rd Annual Greater Boston Area Statistical Mechanics Meeting held in UMass-Amherst, 2022.
- UCSD Fluid Mechanics Seminar Series, 2021.
- Continuum Mechanics and Industrial Mathematics group at the University of Strathclyde, 2021.

Teaching at Princeton

- Fall 2019, Graduate-Classical Papers in Fluid Mechanics, 11 students.

Awards & Honors

- American Chemical Society Petroleum Research Fund Doctoral New Investigator Award, 2022.