Ziwen He

Post-doctoral Research Associate
Department of Chemical Engineering and Materials Science
University of Minnesota Twin Cities
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EDUCATION

Ph.D. in Mechanical Engineering, Baylor University, Waco, TX December 2023
Dissertation: "Air entrainment dynamics under droplets from Newtonian to non-Newtonian fluids and their applications."
Advisor: Min Y. Pack

B.S. in Mechanical Engineering, Florida Institute of Technology, Melbourne, FL May 2019

B.S. in Mechanical Engineering, Shijiazhuang TieDao University, Shijiazhuang, Hebei May 2017

RESEARCH INTEREST

- Interfacial science
- Multiphase flows
- Thin film dynamics
- Polymer rheology

PROFESSIONAL/RESEARCH EXPERIENCE

Post-doctoral Research Associate January 2024 to Present
Department of Chemical Engineering and Materials Science,
University of Minnesota Twin Cities
Advisor: Joseph Zasadzinski

Research Assistant/Lab Manager January 2021 to December 2023
Department of Mechanical Engineering, Baylor University

Teaching Assistant May 2020 to January 2021
Department of Mechanical Engineering, Baylor University

Graduate Assistant May 2019 to May 2020
Department of Mechanical Engineering, Baylor University

REFEREED JOURNAL PUBLICATIONS

1. Pirdavari, P., Tran, H., **He, Z**., & Pack, M. Y. (2024). Drainage-induced spontaneous film climbing in capillaries. *Physics of Fluids*. (Under Review)
2. **He, Z**., Tran, H., & Pack, M. Y. (2024). Capillary wave-assisted collapse of non-Newtonian droplets. *Physical Review Letter.* (Under Review)
3. Tran, H**., He, Z**., & Pack, M. Y. (2024). Microbubble entrainment on thin liquid films under drop impacts. *Journal of Fluid Mechanics*. (Under Review)
4. Upoma, M. A., **He, Z**., Tran, H., & Pack, M. Y. (2024). Extensional Rheological Effects of Dye-Polymer Solutions. *Physics of Fluids*. (Under Review)
5. **He, Z**., Upoma, M. A., & Pack, M. Y. (2023). Dual nature of volatility on drop wetting dynamics of acetone–isopropanol mixtures on ultrathin smooth oil films. *Physics of Fluids*, 35(1), 012115.

6. Pirdavari, P., Pourfattah, F., Tran, H., Wang, L., **He, Z**., & Pack, M. Y. (2023). Experimental and numerical study on the performance index of mixing for low aspect ratio serpentine microchannels. *Journal of Micromechanics and Microengineering.* (Under Review)
7. Tran, H., **He, Z**., Pirdavari, P., & Pack, M. Y. (2023). Interplay of Drop Shedding Mechanisms on High Wettability Contrast Biphilic Stripe-Patterned Surfaces. *Langmuir*.
8. **He, Z**., Tran, H., & Pack, M. Y. (2022). Air entrainment dynamics of aqueous polymeric droplets from dilute to semidilute unentangled regimes. *Physics of Fluids*.
9. Tran, H., **He, Z**., Sakakeeny, J., Ling, Y., & Pack, M. Y. (2022). Oscillation Dynamics of Drops on Immiscible Thin Liquid Films. *Langmuir*, *38*(3), 1243-1251.
10. **He, Z**., Tran, H., & Pack, M. Y. (2021). Drop Bouncing Dynamics on Ultrathin Films. *Langmuir*, *37*(33), 10135-10142.

CONFERENCE PRESENTATIONS

1. **He Z**., Tran H., Pack M.Y., "Central Collapse of non-Newtonian Droplets", American Physical Society, DFD, Washington, DC, 2023
2. **He Z**., Tran H., Pack M.Y., "Collapse of non-Newtonian droplets", Bluebonnet Symposium. SMU, Dallas, TX, 2023
3. **He Z**., Tran H., Pack M.Y., "Air entrainment dynamics under bouncing Boger droplets", American Physical Society, DFD, Indianapolis, IN, 2022.
4. Tran H., **He Z**., Pack M.Y., "The interplay of dropwise condensation and drop shedding mechanism on biphilic patterned surfaces", American Physical Society, DFD, Indianapolis, IN, 2022.
5. **He Z**., Tran H., Pack M.Y., "Air entrainment dynamics under xanthan gum droplets from dilute to semi-dilute regimes", American Chemical Society, Colloid&Surface Science Symposium, Golden, CO, 2022.
6. Tran H., **He Z**., Pack M.Y., "Dropwise condensation on biphilic patterned surfaces with multiple thermal conductivities", American Chemical Society, Colloid & Surface Science Symposium, Golden, CO, 2022.
7. **He Z**., Tran H., Pack M.Y., " Air entrainment dynamics under xanthan gum droplets". Bluebonnet Symposium. University of Texas at Dallas, Dallas, TX, 2022.
8. Li J., **He Z**., Pack M., "Mesler entrainment-like microbubble entrainment on immiscible thin liquid films", American Physical Society, DFD, Phoenix, AZ, 2021.
9. Tran H., **He Z**., Pack M., "Drop oscillation dynamics on viscous thin immiscible liquid films: slip to pin transitions", American Physical Society, DFD, Phoenix, AZ, 2021.
10. Felton O., **He Z**., Pack M., "How does relative humidity affect the way water droplets interact with a surface?", American Physical Society, DFD, Phoenix, AZ, 2021.
11. **He Z**., Tran H., Pack M., "Entanglement attenuates the entrained air film underneath polymeric droplets", American Physical Society, DFD, Phoenix, AZ, 2021.
12. **He Z**., Tran H., Pack M., "Drop bouncing dynamics on ultra-thin films", American Physical Society, DFD, Phoenix, AZ, 2021.
13. **He. Z**., Tran H., Pack M., "The influence of polymer entanglement on air entrainment dynamics under droplet impacts", Society of Rheology 92nd Annual Meeting, Bangor, ME, 2021.

14. **He Z**., Tran H., Pack M., "Effect of polymer concentrations on air entrainment dynamics", American Chemical Society, Colloid & Surface Science Symposium, University Park, PA, 2021.
15. Tran H., **He Z**., Sakakeeny J., Ling S., Pack M., "Drop oscillation dynamics on thin immiscible liquid films", American Chemical Society, Colloid & Surface Science Symposium, University Park, PA, 2021.
16. **He Z**., Tran H., Pack M., "Drop bouncing dynamics on draining films: the influence of the entrained air layer", American Physical Society, DFD, Chicago, IL, 2020.
17. **He. Z**., Tran H., Pack M., "Drop bouncing dynamics on draining films: the influence of the entrained air layer", American Chemical Society, Colloid & Surface Science Symposium, Houston, TX, 2020.

OTHER PRESENTATIONS

i. Invited Talks

1. **He, Z**., Tran, H., & Pack, M. Y. (2023). Capillary wave-assisted Central Collapse of non-Newtonian Droplets. *University of Minnesota Twin Cities.*
2. **He, Z.**, Tran, H., & Pack, M. (2022). Air entrainment dynamics under shear thinning droplets. *Bear Seminar. Baylor University.*
3. **He, Z**., Tran, H., & Pack, M. (2021). Entanglement attenuates the entrained air film underneath polymeric droplets. *Bear Seminar. Baylor University.*
4. **He, Z**., Tran, H., & Pack, M. Y. (2021). Drop bouncing dynamics on ultrathin films. *Bear Seminar. Baylor University.*

ii. Poster Presentations

1. Suzuki B., Park A., **He Z**., Pack M., "Dye, polymer and light interactions using the air entrainment dynamics of droplets", American Physical Society, DFD, Indianapolis, IN, 2022.
2. Park A., **He Z**., Pack M., "Dye & light effects on droplet pinch-off dynamics", American Physical Society, DFD, Indianapolis, IN, 2022.
3. **He Z**., Tran H., Pack M., "Air entrainment dynamics under shear-thinning droplets", Society of Rheology, Chicago, IL, 2022.

SKILLS/TECHNIQUES

i. Data Analysis

Image analysis and visualization by ImageJ and MATLAB; Data analysis by Excel and JMP.

ii. Equipment

- Photron NOVA S9 High-speed Camera
- Phantom V211 High-speed Camera,
- Olympus IX83 Microscope
- Atomic Force Microscope (AFM)
- Scanned Electron Microscope (SEM)
- FLIR Blackfly S USB3 Camera 1.6MP, 226 fps NIKON D2300
- Laurell Spin Coater
- Harvard Apparatus - PHD Ultra
- New Era NE-300,
- New Era NE-4000 Syringe Pumps,
- Phlox LED panel,
- Anton Paar MCR302e,
- Bohlin Gemini II Rheometer
- OceanOptics spectrometer
- 3D Printers
- Probe Ultrasonicator
- Corona treator
- Oven
- hot plates
- Thorlabs optics

- environmental chambers
- thermocouples
- hygrometers
- Kruss K20 tensiometer

iii. Languages

English (Fluent), Mandarin Chinese (Native)

iv. Software

Microsoft Office, MATLAB, Photoshop, SolidWorks, Creo, AutoCAD, ANSYS Fluent, Rheocompass, OceanView, Phantom camera control (PCC), Photron FASTCAM Viewer (PFV), cellSens

HONORS AND AWARDS

The Graduate Travel Award, Department of Mechanical Engineering, November 2020-October 2023
Baylor University, Waco, TX

APS DFD Travel Grant October 2021
American Physical Society, Phoenix, AZ

Presidential English Proficiency Scholarship, Department of Mechanical Engineering, November 2017
Florida Institute of Technology, Melbourne, FL

Florida Tech Transfer Scholarship, Department of Mechanical Engineering, August 2017
Florida Institute of Technology, Melbourne, FL

National Encouragement Scholarship, Department of Mechanical Engineering, May 2016
Shijiazhuang TieDao University, Shijiazhuang, Hebei

Academic Outstanding Student Scholarship, Department of Mechanical Engineering, November 2015
Shijiazhuang TieDao University, Shijiazhuang, Hebei

PROFESSIONAL AFFILIATIONS

- American Physical Society (APS)
- American Chemical Society (ACS)
- Society of Rheology (SOR)
- American Society of Mechanical Engineers (ASME)
- Society of Plastic Engineering (SPE)

JOURNAL REFEREES

- Physics of Fluids
- Physical Review
- Journal of Applied Physics
- APL Photonics

CONFERENCE REFEREES

- ASME Fluids Engineering Division Summer Meeting