

Hongyi Xiao

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Education

Northwestern University Evanston, IL, USA 2014 – 2018

- PhD, Mechanical Engineering
- Academic advisors: Richard M. Lueptow, Julio M. Ottino, Paul B. Umbanhowar
- Thesis: Kinematics and segregation in granular flows: modeling density difference, shape effects, and unsteady flow fields

Tsinghua University Beijing, China 2010 - 2014

- BE, Thermal Engineering
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Academic Experience

Laboratory for Research on the Structure of Matter (LRSM), University of Pennsylvania

Postdoctoral researcher, 2018-present

- Experimental study of rearrangements and yielding of soft condensed matter.

The Laboratory for Complex Systems and Nonlinear Dynamics in Fluids and Granular Flows, Northwestern University

Research assistant, 2015-2018

- Studied segregation of density bidisperse flowing granular materials using experiments, computer simulations, and theoretical approaches.
- Studying kinematics and segregation of granular materials in unsteady flows with applications in various industrial processes.
- Developing methods for enhanced mixing of strongly segregating granular materials.
- Supervising undergrad study of transient flow dynamics in weakly cohesive granular materials.

Phase Change and Interphase Transfer Laboratory Tsinghua University

Research assistant, 2012-2014

- Conducted experiments for improved boiling heat transfer using silicon nanowire arrays.
- Studied enhancing phase change materials performance via nanoparticle dispersions in paraffin wax.

Publications

- “Diffusion of size bidisperse spheres in dense granular shear flow”, Cai R, Xiao H, Zheng J, Zhao Y, Physical Review E, in preparation.
- “Coupling a continuum granular segregation model with a flow model incorporating granular rheology”, Xiao H, Yan J, Wagner GJ, Ottino JM, Lueptow RM, Umbanhowar PB, Journal of Computational Physics, in preparation.
- “Unsteady flows and inhomogeneous packing in damp granular heap flows”, Xiao H, Hruska J, Ottino JM, Lueptow RM, Umbanhowar PB, Physical Review E, 2018.
- “Continuum modeling of granular segregation during hopper discharge,” Xiao H, Fan Y, Jacob KV, Kodam M, Umbanhowar PB, Lueptow RM, Chemical Engineering Science, 2018.
- “Asymmetric concentration dependence of segregation fluxes in granular flows,” Jones RP, Isner AB, Xiao H, Umbanhowar PB, Ottino JM, and Lueptow RM, Physical Review Fluids, 2018 (editor’s suggestion).
- “DEM simulation and continuum model of segregating rods in the quasi-2D bounded heap,” Zhao Y, Xiao H, Umbanhowar PB, Ottino JM, and Lueptow RM, AIChE Journal, 2018.
- “Transient response in granular quasi-two-dimensional bounded heap flow,” Xiao H, Umbanhowar PB, Ottino JM, and Lueptow RM, Physical Review E, 2017.
- “Controlling granular segregation using modulated flow,” Xiao H, McDonald D, Fan Y, Umbanhowar PB, Ottino JM, and Lueptow RM, Powder Technology, 2017.
- “Modeling segregation in modulated granular flow,” Lueptow RM, Deng Z, Xiao H, Umbanhowar PB, EPJ web of conferences, Powders & Grains, 2017.

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- “Modeling density segregation in flowing bidisperse granular materials,” Xiao H, Umbanhowar PB, Ottino JM, and Lueptow RM, Proceedings of the Royal Society A, 2016 (cover article).

Presentations

- “Kinematics and segregation in granular flows: modeling density difference, shape effects, and unsteady flow fields”, Xiao H, Zhejiang University, July 2018.
- “Unsteady processes in granular heap flows”, Xiao H, Hruska J, Ottino JM, Lueptow RM, and Umbanhowar PB, 18th U.S. National Congress for Theoretical and Applied Mechanics, Chicago, IL, June 2018.
- “Continuum modeling of granular segregation in hopper discharge flows.”, Xiao H, Fan Y, Jacob KV, Umbanhowar PB, Kodam M, Koch JF, and Lueptow RM, 8th World Congress on Particle Technology, Orlando, FL, April 2018.
- “Transient response in granular bounded heap flows”, Xiao H, Umbanhowar PB, Ottino JM, and Lueptow RM, 70th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Denver, CO, November 2017.
- “Stratification of size-bidisperse granular mixtures in a quasi-2D bounded heap with periodic flow modulation”, Xiao H, Umbanhowar PB, Ottino JM, and Lueptow RM, 69th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Portland, OR, November 2016.
- “Mixing and segregation in unsteady granular heap flows”, Xiao H, Umbanhowar PB, Ottino JM, and Lueptow RM, The 7th International Conference on Discrete Element Methods, Dalian, China, August 2016.
- “Modeling density segregation in granular flow”, Xiao H, Umbanhowar PB, and Lueptow RM, 68th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Boston, MA, November 2015.

Posters

- “Coupling a continuum granular segregation model with a flow model incorporating granular rheology”, Xiao H, Yan J, Wagner GJ, Ottino JM, Lueptow RM, and Umbanhowar PB, Gordon Research Conference on Granular Matter, Stonehill College, MA, July 2018.

Professional activities:

- Member of the American Physical Society.
 - Member of the American Institute of Chemical Engineers.
 - Reviewer for Powder Technology.
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Industrial Experience

The Dow Chemical Company, Midland, Michigan

Summer 2017

Intern in Engineering & Processing Science, Corporate R&D

- Performed Discrete Element Method simulations of granular materials segregation in hopper discharge processes.
 - Developed a mathematical model to predict segregation in hoppers for industrial design.
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Awards and honors

- Martin Outstanding Doctoral Fellowship, Northwestern University, 2017.
 - Belytschko Outstanding Research Award, Northwestern University, 2018.
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