RAN QIAO

Department of Modern Mechanics, University of Science and Technology of China (USTC), Hefei, China

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EDUCATION

University of Science and Technology of China, Ph.D Candidate 2018.09 - Present

- Major in Fluid Mechanics; Advisor: Prof. Ting Si
- Obtained Academic Excellence Scholarship 6 times from 2018 to 2023; Published 11 research articles.

Hohai University, Bachelor of Science 2014.09 - 2018.06

- Major in Engineering Mechanics;
- Obtained Academic Excellence Scholarship 4 times from 2014 to 2018.

RESEARCH INTERESTS

Interfacial dynamics, Multi-phase flow, Wetting phenomena, Liquid jets/films instability, Droplet dynamics, Marangoni effect, Micro/Nano hydrodynamics

PUBLICATIONS

- **Qiao R**, Zhao C, Ding Z *et al.* Velocity modulation on the linear instability of liquid jets in ambient gas, **Physics of Fluids**, 2024, 36(1):012117.
- Shi G*, Huang Z*, **Qiao R*** *et al.* Manipulating solvent fluidic dynamics for large-area perovskite film formation and white light-emitting diodes, **Nature Communications**, 2024, 15:1066. (∗: co-first author)
- **Qiao R**, Mu K, and Si T, Analytical instability theory of a liquid jet under a thermal field, **Acta Mechanica Sinica**, 2023, 32:323086.
- **Qiao R**, Mu K, Luo X *et al.* Instability and energy budget of a viscous coaxial jet under a radial thermal field, **Physics of Fluids**, 2020, 32(12):122103.
- Zhao C, **Qiao R**, Mu K, *et al.* Inertia and slip effects on the instability of a liquid film coated on a fibre, **Journal of Fluid Mechanics**, 2024, 982, A13.
- Mu K, **Qiao R**, Ding H *et al.* Modulation of coaxial cone-jet instability in active co-flow focusing, **Journal of Fluid Mechanics**, 2023, 977, A14.
- Xu Y, Mu K, **Qiao R** *et al.* Swirling instability of coaxial liquid jet in gas surroundings, **Physics of Fluids**, 2023, 35(12):122102.
- Mu K, **Qiao R**, Guo J *et al.* Parametric study on stability and morphology of liquid cone in flow focusing, **International Journal of Multiphase Flow**, 2021, 135:103507.
- Mu K, **Qiao R**, Si T *et al.* Interfacial instability and transition of jetting and dripping modes in a co-flow focusing process, **Physics of Fluids**, 2021, 33(5):052118.
- Wang S, Zhu Z, Ma C, **Qiao R** *et al.* Generation of non-spherical liquid metal microparticles with tunable shapes exhibiting electrostatic-responsive performance, **ACS Applied Materials & Interfaces**, 2021, (13) 16677-16687.
- Yang C, **Qiao R**, Mu K *et al.* Manipulation of jet breakup length and droplet size in axisymmetric flow focusing upon actuation, **Physics of Fluids**, 2019, 31(9):091702.
- **Qiao R**, Mu K, Zhao C *et al.* On the instability of non-isothermal liquid jets, *Under consideration for publication in Journal of Fluid Mechanics.*

PATENT

- Si T, Yang C, **Qiao R**, A device and method for producing uniform single emulsion droplets with high throughput, Chinese Patent, CN111841439A.

RESEARCH PROJECTS

- **Marangoni instability of the non-isothermal liquid jet**

  (1) Supported by National Natural Science Foundation of China (Grant No. 12027801);

  (2) My duty: Physical modeling, physical mechanism analysis, numerical simulation, data analysis;

- **Hydrodynamics of liquid jets under velocity modulation**

  (1) Supported by National Natural Science Foundation of China (Grant No. 12388101);

  (2) My duty: Physical modeling, experiments, physical mechanism analysis, data analysis;

- **Non-Newtonian hydrodynamics in flow-focusing**

  (1) Supported by National Natural Science Foundation of China (Grant No. 12272372);

  (2) My duty: Physical modeling, numerical simulation, data analysis;

- **Slip effect on the instability of liquid films on a fibre**

  (1) Supported by National Natural Science Foundation of China (Grant No. 12202437);

  (2) My duty: Instability analysis, data analysis;

- **Droplet dynamics on a solid substrate**

  (1) Supported by National Natural Science Foundation of China (Grant No. 1872274) and National Key research and Development Program of China (Grant No. 2022YFA1204800);

  (2) My duty: Numerical simulation, data analysis.

CONFERENCE PRESENTATIONS

- 2023.07 'Instability analysis of liquid jets under a thermal field'. Oral Presentation in 4th. International Symposium on Thermal-Fluid Dynamics, Nanjing, China.
- 2022.11 'Interfacial instability of liquid jets modulated by a thermal field'. Oral Presentation in 12th. National Academic Conference on Fluid Mechanics, online.
- 2020.12 'Linear instability of a viscous coaxial jet under a thermal field'. Oral Presentation in 11th. National Academic Conference on Fluid Mechanics, Shenzhen, China.

GRANTS & AWARDS

- Excellent Oral Presentation Award, Post-graduated Students Academic Forum, USTC, (2020);
- First-prize winner, Jiangsu Province Mechanics Competition for University Students, (2017).
- Second place, 7th. International Engineering Mechanics Competition, Belarus, (2016).

SKILLS & STRENGTHS

- Code: MATLAB, FORTRAN, C, Python
- Software: COMSOL, BASILISK, Paraview, Tecplot, Solidworks and so on
- Others: Micro/Nano fluid experiments, high-speed photography

REFEREES

- **Prof. Dr. Ting Si**
  University of Science and Technology of China, tsi@ustc.edu.cn
- **Assoc. Prof. Dr. Kai Mu**
  University of Science and Technology of China, mukai@ustc.edu.cn
- **Assoc. Prof. Dr. Chengxi Zhao**
  University of Science and Technology of China, zhaochengxi@ustc.edu.cn