

Jin-Tae “Jimmy” Kim, Ph.D.

Postdoctoral Fellow at Northwestern University

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EDUCATION/CURRENT POSITION

- Northwestern University** Chicago, IL
Postdoctoral Fellow, Querrey Simpson Institute for Bioelectronics 07/2020-present
Advisor: *John A. Rogers*
- University of Illinois at Urbana-Champaign** Urbana-Champaign, IL
PhD., Theoretical Applied Mechanics 06/2015-2020
Advisor: *Leonardo P. Chamorro*
Thesis: Lagrangian dynamics and applications via 3D Particle Tracking Velocimetry
M.S., Theoretical Applied Mechanics 08/2013-05/2015
- Oklahoma State University** Stillwater, Ok
B.S., *Cum Laude*, Mechanical Engineering (Minor in Mathematics) 08/2009-05/2013
Research topic: Heating, ventilation and air conditioning

RESEARCH GRANTS

- National Science Foundation (CBET) “Towards Boundary-layer Control using Shape Morphing Programmable Materials” (Invited for a Full Proposal, PI: **Jin-Tae Kim**)
- National Institutes of Health (SBIR) “Ambulatory Voice Dosimeter System” (Under Review, PI: John A. Rogers, Key Personnel: **Jin-Tae Kim**)
- Querrey Simpson Institute for Bioelectronics (Opportunity Grant) “Biocompatible Adhesives and Encapsulant Materials for Skin-interfaced Biosensors” (2020-2021, PI: **Jin-Tae Kim**)-\$15,000
- National Science Foundation (CBET) “Dynamics of Inertial Particles in Thermally-Stratified Flows within Electromagnetic Field” (2019-2022, PI: Leonardo P. Chamorro, Assistant: **Jin-Tae Kim**)

HONORS AND AWARDS

- Hassan Aref Memorial Award for Theoretical and Applied Mechanics Spring 2020
- College Graduate Conference Scholarship Fall 2014/Fall 2019
- Department Schaller Travel Funds Fall 2014/Fall 2019
- 3rd place ASHRAE Student Design Competition Spring 2013
- MAE Scholarship Funds at OSU Fall 2012

PUBLICATIONS

Peer-Reviewed Journal Publications (^ Co-first author, * Corresponding author)

- 33.** Kim J.-T.[^], Ouyang W.[^], Hwang H.[^], Jeong H.[^], Kang S., Bose S., Kwak S.S., Ni X., Kim H., Park J., Chen H., Soetikno A., Kim J., Xu S., Chamorro L.P.*^{*}, Rogers J.A.*^{*}, "Dynamics of Plosive Speech via Imaging, Computations, and Soft-electronics," *Proceedings of the National Academy of Sciences USA*, accepted.

32. Yang Q.[^], Hu Z.[^], Seo M.H., Xu Y., Yan Y., Hsu Y.-H., Berkovich J., Lee K., Liu T.-L., McDonald S., Nie H., Oh H., Wu M., **Kim J.-T.**, Miller S.A., Jia Y., Butun S., Bai W., Guo H., Choi J., Banks A., Ray W.Z., Kozorovitskiy Y., Becker M.L., Pet M.A., MacEwan M.R., Chang J.-K., Wang H.*^{*}, Huang Y.*^{*}, Rogers J.A.*^{*}, "High-speed, Scanned Laser Structuring of Multi-layered Eco/bioresorbable Materials for Advanced Electronic Systems," *Nature Communications*, accepted.
- 31.** Kang Y.J.[^], Arafa H.M.[^], Yoo J.[^], Kantarcigil C.[^], **Kim J.-T.**[^], Jeong H.[^], Yoo S., Oh S., Kim J., Tzavelis A., Wu Y., Winograd J., Kwon K., Xu S., Martin-Harris B.*^{*}, Rogers J.A.*^{*}, "Soft Skin-Interfaced Mechano-Acoustic Sensors for Real-Time Monitoring and Patient Feedback on Respiratory and Swallowing Biomechanics," *npj Digital Medicine*, 147 (2022).
30. Wu Y.[^], Wu M.[^], Vazquez-Guardado A.[^], Kim J.[^], Zhang X., Avila R., **Kim J.-T.**, Deng Y., Xu Y., Melzer S., Bai Y., Yoon H., Meng L., Zhang Y., Guo H., Yu Y., Hong L., Kanatzidis E., Haney C.R., Waters E.A., Bank A., Hu Z., Lie F., Chamorro L.P., Sabatini B.L., Huang Y.*^{*}, Kozorovitskiy Y.*^{*}, Rogers J. A.*^{*}, "Wireless Multi-lateral Optofluidic Micro-Systems for Real-Time Programmable Optogenetics and Photopharmacology," *Nature Communications*, 13:5571 (2022).
29. Bai Y.[^], Wang H.^{^*}, Xue Y., Pan Y., **Kim J.-T.**, Ni X., Liu T.-L., Yang Y., Han M., Huang Y.*^{*}, Rogers J.A.*^{*}, Ni X.*^{*}, "A Dynamically Reprogrammable Surface with Self-Evolving Shape Morphing," *Nature* 609, 701-708 (2022).
- 28.** Ni X.[^], Luan H.[^], **Kim J.-T.**[^], Rogge S.I., Bai Y., Kwak J.W., Liu S., Yang D.S., Li S., Li Z., Wu C., Ni X., Wang H.*^{*}, Huang Y.*^{*}, Rogers J.A.*^{*}, "Soft Shape-Programmable Surfaces by Fast Electromagnetic Actuation of Liquid Metal Networks," *Nature Communications*, 13:5576 (2022).
- 27.** Jung Y.H.[^], Yoo J.-Y.[^], Vazquez-Guardado A.[^], Kim J.-H.[^], **Kim J.-T.**[^], Luan H., Park M., Lim J., Shin H.-S., Su C.-J., Schloen R., Trueb J., Avila R., Yang D., Park Y., Ryu H.J., Yoon H.-J., Lee G., Jeong H., Kim J.U., Huang Y.*^{*}, Rogers J.A.*^{*}, "A wireless haptic interface for programmable patterns of touch across large areas of the skin," *Nature Electronics*, 1-12 (2022).
26. Ji B.[^], Liu H.[^], **Kim J.-T.**, Chamorro L.P., Feng J.*^{*}, "Dynamics of an Oil-coated Bubble Rising in a Quiescent Water Medium," *Physical Review Fluids* 7(3), 033603 (2022).
25. Choi J.[^], Han S.[^], Baliwag M., Kim B.H., Jang H., **Kim J.-T.**, Hong I., Kim T., Kang S.M., Lee K.-T., Kang D., Rogers J.A.*^{*}, "Artificial Stretchable Armor for Skin-interfaced Wearable Devices and Soft Robotics," *Extreme Mechanics Letters*, 101537, (2022).
- 24.** Kim B.H.[^], Li K.[^], **Kim J.-T.**[^], Park Y.[^], Jang H., Wang X., Xie Z., Won S.M., Yoon H.-J., Lee G., Jang W.J., Lee K.H., Chung T.S., Jung Y.H., Heo S.Y., Lee Y., Kim J., Cai T., Kim Y., Prasopsukh P., Yu Y., Yu X., Avila R., Luan H., Song H., Zhu F., Zhao Y., Chen L., Han S.H., Kim J., Oh S.J., Lee H., Lee C.H., Huang Y.*^{*}, Chamorro L.P.*^{*}, Zhang Y.*^{*}, Rogers J.A.*^{*}, "Three-Dimensional Electronic Microfliers Inspired by Wind-Dispersed Seeds," *Nature* 597, 503-510 (2021). [**Cover Article**]

23. Jeong H.[^], Kwak S.S.[^], Sohn S., Lee Y.J., O'brien M.K., Park Y., Avila R., **Kim J.-T.**, Lee J.Y., Irie M., Jang H., Shawen N., Lee K., Andersen R.A., Huang Y., Jayaraman A., Davis M.M., Shanley T., Wakschlag L.S., Krogh-Jespersen S., Xu S., Ryan S.W., Lieber R.L., Rogers J.A.*, "Miniaturized Wireless, Skin-Integrated Sensor Networks for Quantifying Full-Body Movement Behaviors and Vital Signs in Infants," *Proceedings of the National Academy of Sciences USA*, 118(43), (2021).
- 22.** **Kim J.-T.**, Kim Y., Kang S., Nam J., Lee C., Chamorro L.P.*, "Effect of the Aspect Ratio on the Dynamics of Air Bubbles within Rayleigh–Bénard Convection," *Physics of Fluids* 33(9), 095104 (2021).
21. Chen D., **Kim J.-T.**, Chamorro L.P., Timperman A.T.*, "Exceeding ohmic scaling by more than one order of magnitude with a 3D ion concentration polarization system," *Lab on a Chip* 21(16), 3094-3104 (2021). **[Cover Article]**
- 20.** Jeong H.[^], Lee J.Y.[^], Lee K.[^], Kang Y.J.[^], **Kim J.-T.**[^], Avila R., Travelis A., Kim J., Ryu H., Kwak S.S., Kim J.U., Banks A., Jang H., Chang J.-K., Li S., Mummidisetty C.K., Park Y., Nappi S., Chun K.S., Lee Y.J., Kwon K., Ni X., Chung H.U., Luan H., Kim J.-H., Wu C., Xu S., Banks A., Jayaraman A., Huang Y., Rogers J.A.*, "Differential Cardiopulmonary Monitoring System for Artifact-canceled Physiological Tracking of Athletes, Workers, and COVID-19 Patients," *Science Advances* 7(2), eabg3092 (2021).
- 19.** Liu C.[^], **Kim J.-T.**[^], Kwak S.S.[^], Hourlier-Fargette A.[^], Avila R., Vogl J., Tzavelis A., Chung H.U., Lee J.Y., Kim D.H., Ryu D., Fields K.B., Ciatti J.L., Li S., Irie M., Bradley A., Shukla A., Chavez J., Dunne E.C., Kim S.S., Kim J., Park J.B., Jo H.H., Kim J., Johnson M.C., Kwak J.W., Madhvapathy S.R., Xu S., Rand C.M., Marsillio L.E., Hong S.J., Huang Y.*, Weese-Mayer D.E.*, Rogers J.A.*, "Wireless, Skin-interfaced Devices for Pediatric Critical Care: Application to Continuous, Noninvasive Blood Pressure Monitoring," *Advanced Healthcare Materials*, 2100383 (2021). **[Back Cover Article]**
18. Ni X.[^], Ouyang W.[^], Jeong H.[^], **Kim J.-T.**, Tzavelis A., Mirzazadeh A., Wu C., Lee J., Keller M., Mummidisetty C. K., Patel M., Shawen N., Huang J., Chen H., Ravi S., Chang J.-K., Lee K.H., Wu Y., Lie F., Kang Y.J., Kim J.U., Chamorro L.P., Banks A.R., Bharah A., Jayaraman A., Xu S., Rogers J.A.*, "Automated, Multiparametric Monitoring of Respiratory Biomarkers and Vital Signs in Clinical and Home Settings for COVID-19 Patients," *Proceedings of the National Academy of Science USA* 118(19), (2021).
17. Kim G., Cheng S., Hong L., **Kim J.-T.**, and Chamorro L. P.*, "On the Acoustic Fountain Types and Flow Induced with Focused Ultrasound," *Journal of Fluid Mechanics (Rapid)* 909, (2021).
16. Cai T., **Kim J.-T.**, Cheng S., Ma F., and Chamorro L.P.*, "On the Effect of Orifice Thickness and Divergence Angle in the Near and Intermediate Fields of Axisymmetric Jets," *Experimental Thermal and Fluid Science* 123, 110293 (2021).
- 15.** **Kim J.-T.**, Jin Y., Shikun S., Ankan D., and Chamorro L. P.*, "Free Fall of Homogeneous and Heterogeneous Cones," *Physical Review Fluids* 5(9), 093801 (2020).
- 14.** **Kim J.-T.**, Nam J., Shen S., Lee C. and Chamorro L.P.*, "On the Dynamics of Air Bubbles in Rayleigh–Bénard Convection," *Journal of Fluid Mechanics* 891, (2020).

13. Jin Y., **Kim J.-T.**, Cheng S., Barry O., Chamorro L.P.*, “On the Distinct Drag, Reconfiguration and Wake of Perforated Structures,” *Journal of Fluid Mechanics* 890, (2020).
- 12.** **Kim J.-T.** and Chamorro L.P.*, “Lagrangian Description of the Unsteady Flow induced by a Single Pulse of a Jellyfish,” *Physical Review Fluids* 4(6), 064605 (2019).
11. Anderson P.S.L.*, Stephanie B.C., **Kim J.-T.** and Chamorro L.P., “Taking a Stab at Quantifying the Energetics of Biological Puncture,” *Integrative and Comparative Biology* 59(6), 1586-1596 (2019).
10. Jin Y., **Kim J.-T.**, Fu S. and Chamorro L.P.*, “Flow-induced Motions of Flexible Plates: Fluttering, Twisting and Orbital Modes,” *Journal of Fluid Mechanics* 864, 273-285 (2019).
- 9.** **Kim J.-T.**, Jin Y. and Chamorro L.P.*, “Dynamics of Flexible Plates and Flow under Impulsive Oscillation,” *Journal of Fluids and Structures* 87, 319-333 (2019).
8. Fu S., Jin Y., **Kim J.-T.**, Mao Z., Zheng Y. and Chamorro L.P.*, “On the Dynamics of Flexible Plates under Rotational Motions,” *Energies* 11(12), 3384 (2018).
- 7.** **Kim J.-T.**, Shen S., DiMarco S.L. and Chamorro L.P.*, “Lagrangian Acceleration in Rayleigh-Bénard Convection at Various Aspect Ratios,” *Physical Review Fluids* 3(11), 113502 (2018).
6. Jin Y., **Kim J.-T.**, Hong L. and Chamorro L.P.*, “Flow-induced Oscillations of Low-aspect-ratio Flexible Plates with Various Tip Geometries,” *Physics of Fluids (Featured)* 30(9), 097102 (2018).
5. Jin Y., **Kim J.-T.**, Mao Z. and Chamorro L.P.*, “On the Couple Dynamics of Wall-mounted Flexible Plates in Tandem,” *Journal of Fluid Mechanics (rapids)* 852, (2018).
4. Jin Y., **Kim J.-T.**, and Chamorro L.P.*, “Instability-driven Frequency Decoupling between Structure Dynamics and Wake Fluctuations,” *Physical Review Fluids* 3(4), 044701 (2018).
- 3.** **Kim J.-T.**, Liberzon A., and Chamorro L.P.*, “Characterization of the Eulerian and Lagrangian Accelerations in the Intermediate Field of Turbulent Circular Jets,” *Journal of Turbulence* 18(1), 87-102 (2017).
- 2.** **Kim J.-T.**, Zhang Z., Liberzon A., Zhang Y., and Chamorro L.P.*, “On the Lagrangian Features of Circular and Semicircular Jets via 3D Particle Tracking Velocimetry,” *Experimental Thermal and Fluid Science* 77, 306-316 (2016).
- 1.** **Kim J.-T.**, Kim D., Liberzon A., and Chamorro L.P.*, “Three-Dimensional Particle Tracking Velocimetry for Turbulence Applications: Case of a Jet Flow,” *Journal of Visualized Experiments* 108, (2016).

Selected Conference Presentations

15. **Kim J.-T.**, Chamorro L.P., Rogers J. A., “Three-Dimensional Electronic Microfliers Inspired by Wind-Dispersed Seeds,” *Bulletin of the American Physical Society*, 2021.
14. **Kim J.-T.**, Jeong H., Kang Y.J., Chamorro L.P., Rogers J. A., “Dynamics of Droplets on COVID-19 Transmission via a Soft Wireless Device and Particle Tracking

Velocimetry,” *Bulletin of the American Physical Society*, (2020) [**Selected by the APS Press Office**].

13. Hong L., Ji B., **Kim J.-T.**, Feng J., Chamorro L.P., “Experimental Study of Oil-coated Bubble Rising Dynamics,” *Bulletin of the American Physical Society*, (2020).
12. Kang S., **Kim J.-T.**, Shen S., Chamorro L.P., “On the Dynamics of Air Bubbles in Rayleigh-Benard Convection at Various Aspect Ratios,” *Bulletin of the American Physical Society*, (2020).
11. Chamorro L.P., **Kim J.-T.**, Nam J., Shen S. Lee C., “Dynamics of Air Bubbles in Rayleigh-Bénard Convection: Pair Dispersion and Effect of Initial Separation,” *Bulletin of the American Physical Society*, (2019).
10. **Kim J.-T.**, Chamorro L.P., “Lagrangian Description of the Unsteady Flow Induced by a Jellyfish,” *Bulletin of the American Physical Society*, (2019).
9. **Kim J.-T.**, Shen S., Jin Y., Chamorro L.P., “On the Lagrangian Acceleration in Rayleigh-Bénard Convection: Effect of Aspect Ratio,” *Bulletin of the American Physical Society*, (2018).
8. Mao Z., Jin Y., **Kim J.-T.**, Zhou H., Chamorro L.P., “On the Coupled Dynamics of Wall-Mounted Flexible Plates in Tandem,” *Bulletin of the American Physical Society*, (2018).
7. Hong L., **Kim J.-T.**, Jin Y., Chamorro L.P., “Dynamics of Flexible Plates and Induced Flow under Heavyside Acceleration Heaving,” *Bulletin of the American Physical Society*, (2018).
6. Lai W., Troolin D., **Kim J.-T.**, Jin Y., Liu H., Chamorro L.P., “On the Dynamics in the Vicinity of a Shear Layer of a Recirculation Bubble Past a Canopy Patch,” *Bulletin of the American Physical Society*, (2017).
5. **Kim J.-T.**, Piper M., Chamorro L.P., “Flow Acceleration Structure of Aurelia Aurita: Implications on Propulsion,” *Bulletin of the American Physical Society*, (2017).
4. Piper M., **Kim J.-T.**, Chamorro L.P., “On the Dynamics of Jellyfish Locomotion via 3D Particle Tracking Velocimetry,” *Bulletin of the American Physical Society*, (2016).
3. **Kim J.-T.**, Liberzon A., Chamorro L.P., “Eulerian and Lagrangian Accelerations in the Intermediate Field of Turbulent Circular Jets,” *Bulletin of the American Physical Society*, (2016).
2. **Kim J.-T.**, Liberzon A., Chamorro L.P., “On the Local Acceleration and Flow Trajectory of Jet Flows from Circular and Semi-circular Pipes via 3D Particle Tracking Velocimetry,” *Bulletin of the American Physical Society*, (2015).
1. **Kim J.-T.**, Liberzon A., Zamalloa C.Z., Chamorro L.P., “Characterization of Far-Field Jet Flows from Complex Nozzles via Particle Tracking Velocimetry,” *Bulletin of the American Physical Society*, (2014).

INVITED TALKS

3. “Three-dimensional Electronic Microfliers Inspired by Wind-dispersed Seeds,”
Department of Mechanical & Aerospace Engineering Seminar Series, Oklahoma State University, February 11, 2022, Stillwater, OK
2. “The Potential Applications of Bio-inspired 3D Electronic Microfliers for Environmental Sensing,” *Advanced Radar Research Center Seminar, University of Oklahoma*, February 8, 2022, Norman, OK
1. “Three-dimensional Electronic Microfliers Inspired by Wind-dispersed Seeds,”
Departments of Mechanical Engineering and Engineering Sciences & Applied Mathematics Seminar Series, Northwestern University, January 24, 2022, Evanston, IL

RESEARCH EXPERIENCE

Postdoctoral Fellow, Northwestern University 07/2020-Present

- Fluid Mechanics in Soft-electronics
 - Development of Bioinspired Microflier Sensors
 - Flow Characterization of Drug Delivery Optofluidic Microsystems
 - Flow Structure Interaction between Aortic Flow and Bioresorbable Implantable Device
- Optical Measurement Techniques
 - Development and Optimization of Optical Imaging Methods including (i) Particle Tracking Velocimetry, (ii) Particle Image Velocimetry, (iii) Digital Image Correlation, (iv) Stereoscopic Imaging and (v) Lidar
- Wearable Device Technologies
 - Correlation between Droplet Dynamics and Mechano-acoustic Signals
 - Dynamics of Suprasternal Notch and Sternal Manubrium during Cardiac Activities
- Haptic Interface Technologies
 - Surface Wave Dynamics Induced by Vibrotactile Sensors
 - Dynamics of Different Types of Vibrotactile Sensors
- Programmable Materials
 - 3D Mapping of the Programmable Surface Made of Liquid Metal Soft Microfluidics

Research Assistant, University of Illinois at Urbana-Champaign 05/2013-06/2020

- Convective Turbulence in Rayleigh-Bénard Convection
 - Pair Dispersion and Lagrangian Acceleration at Various Aspect Ratios
 - Bubble Dynamics in the Lagrangian Frame of Reference
- Biological Systems
 - Turbulence Induced by Jellyfish Swimming in the Lagrangian Frame of Reference
 - Puncture Dynamics Induced by Viper Fang
- Flow-structure Interaction
 - Dynamics of Flexible Plates and Flow under Impulsive Oscillation
 - Quantification of Flexible Structures’ Oscillation under Various Complex Flows

TEACHING

Teaching Assistant, University of Illinois at Urbana-Champaign

- ME 310 Fundamentals of Fluid Dynamics Fall’/Spring’ 2014/2015/2016
 - Ranked as Excellent Teacher Selected by Students Six Consecutive Semesters

- TAM 335 Introductory Fluid Mechanics
- ENG 598 Teaching and Leadership

Spring' 2019
Fall' 2019