

Curriculum Vitae – Chang-kwon Kang

Education

- PhD, 2011, Department of Aerospace Engineering, University of Michigan, Ann Arbor
 - Dissertation: Aerodynamics, Scaling, and Performance of a Flexible Flapping Wing
 - Advisors: Dr. Wei Shyy and Dr. Carlos Cesnik
- MSc, 2005, Department of Aerospace Engineering, Delft University of Technology, The Netherlands
 - Thesis: Topological Analysis of Fourth Order Juncture Flow
 - Advisor: Dr. Peter Bakker
- BSc, 2002, Department of Aerospace Engineering, Delft University of Technology, The Netherlands, Cum Laude

Professional Experience

- 2019 – present, Associate Professor, Department of Mechanical and Aerospace Engineering, University of Alabama in Huntsville, USA
- 2013 – 2019, Assistant Professor, Department of Mechanical and Aerospace Engineering, University of Alabama in Huntsville, USA
- 2011 – 2013, Postdoctoral Research Fellow, Department of Aerospace Engineering, University of Michigan, Ann Arbor, USA; Advisor: Dr. Wei Shyy
- 2007 – 2011, Graduate Student Research Assistant, Department of Aerospace Engineering, University of Michigan, Ann Arbor, USA; Advisor: Dr. Wei Shyy, Dr. Carlos Cesnik
- 2001 (Jun) – 2001 (Nov), Visiting Scholar, Arizona State University, Tempe, USA; Advisor: Dr. William Saric

Research Interests

Applied fluid dynamics with focus on modeling and analysis of multi-disciplinary complex systems

- Theoretical and computational modeling of unsteady fluid dynamics
- Bioinspired fluid dynamics, locomotion in biology, bioinspired flight on Mars
- Fluid-structure and fluid-structure-dynamic interaction
- Modeling, analysis, and control of dynamics of moving bodies
- Reduced order models and surrogate models; statistical learning methods
- Biomechanics

Funding Support (External)

- PI, “Alabama Space Grant Consortium Fellowship: Bioinspired Flight Vehicle with Flexible Wings for Aerial Exploration on Mars”; NASA National Space Grant College and Fellowship, 8/1/2019 – 7/31/2020, \$37,000 (Student fellow: Jeremy Pohly)
- PI, “Collaborative Research: Dynamics and Control of Long Range Micro Air Vehicles Inspired by Monarch Butterflies”, NSF CMMI-1761618, 6/1/2018 – 5/31/2021, \$276,876, CO-PI: Dr. Taeyoung Lee (George Washington University)
- PI, “Marsbee - Swarm of Flapping Wing Flyers for Enhanced Mars Exploration”; NASA Institute of Advanced Concepts Phase I, 80NSSC18K0870, 5/15/2018 – 2/14/2019, \$125,000, CO-PIs: Dr. Farbod Fahimi, Dr. Guangsheng Zhang, Dr. Brian Landrum, Dr. Robert Griffen (University of Alabama in Huntsville); Dr. Taeyoung Lee (George Washington University); Dr. Hikaru Aono (Tokyo University of Science)

- PI, “Alabama Space Grant Consortium Fellowship: Bioinspired Flight Vehicle with Flexible Wings for Aerial Exploration on Mars”; NASA National Space Grant College and Fellowship, 8/1/2018 – 7/31/2019, \$37,000 (Student fellow: Jeremy Pohly)
- PI, “Alabama Space Grant Consortium Fellowship: MarsBees – Can bees Fly on Mars?”; NASA National Space Grant College and Fellowship, 8/1/2017 – 7/31/2018, \$37,000 (Student fellow: Jeremy Pohly)
- CO-I, “REU Site: Fundamental Research Topics Related to Unmanned Systems,” NSF EEC-1359311, 3/15/2014 – 3/14/2017, \$297,792, PI: Dr. Farbod Fahimi; CO-PI: Dr. Ramazan Aygun
- CO-I, “The Beneficial Effects of Butterfly Scales,” NSF CBET-1335572, 9/1/2013 – 8/31/2016, \$118,254, PI: Dr. Brian Landrum; CO-PI: Dr. Nathan Slegers

Funding Support (Internal)

- PI, UAH Research Infrastructure Fund Award, 2018, 1 year, \$15,575, CO-PIs: Dr. Brian Landrum; Dr. Shannon Mathis, Dr. Ryan Connors (Kinesiology)
- CO-PI, UAH Individual Investigator Distinguished Research Award, 2018, 1 year, \$44,000, PI: Dr. Shannon Mathis (Kinesiology)
- CO-PI, UAH Cross-College Faculty Research, 2016, 1 year, \$5,000, PI: Dr. Shannon Mathis (Kinesiology); CO-PIs: Dr. Brian Landrum; Dr. Ryan Connors (Kinesiology)
- PI, UAH Research Infrastructure Fund Award, 2015, 1 year, \$11,727.48
- PI, UAH Individual Investigator Distinguished Research Award, 2014, 1 year, \$39,940
- PI, UAH New Faculty Research Program Award, 2013, 1 year, \$4,555

Honors and Awards

- University of Alabama in Huntsville, Outstanding Junior Faculty of the College of Engineering, 2019
- NASA Innovative Advanced Concepts Fellow, 2018
- NATO RTO Scientific Achievement Award (AVT-149, Chair: Dr. Michael Ol), 2011

Student Honors and Awards

- Madhu Sridhar, 2019 AIAA 2019-0566, 2019 AIAA Atmospheric Flight Mechanics Best Student Paper
- Jeremy Pohly, 2019, Outstanding graduate student of the Mechanical and Aerospace Engineering at the University of Alabama in Huntsville
- Darnisha Crane, 2018 Research Horizons Day: First place; College of Engineering; Undergraduate
- Madhu Sridhar, 2018, Outstanding graduate student of the Mechanical and Aerospace Engineering at the University of Alabama in Huntsville
- James Bluman, 2017, Outstanding graduate student of the Mechanical and Aerospace Engineering at the University of Alabama in Huntsville
- Deepa Kodali, 2016 Zonta International Amelia Earhart Fellowship

Publications (supervised students are underlined)

Book

- B1 Shyy, W., Aono, H., **Kang, C.** and Liu, H. *An Introduction to Flapping Wing Aerodynamics*, Cambridge University Press, 2013

Journal Publications: under review

- J1 Raghu, S. L., **Kang, C.**, Landrum, D.B., Whitehead, P, and Conners, R. T., “Kinematic Analysis of Gait in an Underwater Treadmill using Land-Based Vicon T40s Motion Capture Cameras Arranged Externally,” *Journal of Biomechanics*, under review

Journal Publications

- J29 K. C., Tejaswi, **Kang, C.**, and Lee, T, “Dynamics and Control of a Flapping Wing UAV with Abdomen Undulation Inspired by Monarch Butterfly,” *2021 American Control Conference*, accepted
- J28 Sridhar, M.K., **Kang, C.**, Landrum, D.B., Aono, H., Mathis, S.H., Lee, T., “Unconventionally high lift coefficients in Monarch butterflies at high-altitude conditions”, *Bioinspiration & Biomimetics* (2019 impact factor: 3.062), in press
- J27 K. C., Tejaswi, Sridhar, M.K., **Kang, C.**, and Lee, T, “Effects of Abdomen Undulation in Energy Consumption and Stability for the Flights of Monarch Butterfly,” *Bioinspiration & Biomimetics* (2019 impact factor: 3.062), in press
- J26 Hefner, C, **Kang, C.**, Qiu, H., and Shyy, W. "Distinct Aerodynamics of Insect Flight," *Cambridge Elements*, in press
- J25 Pohly, J., **Kang, C.**, Sridhar, M.K., Landrum, D.B., Bluman, J.E., Aono, H., “Scaling Bioinspired Mars Flight Vehicles for Hover," *Acta Astronautica* (2019 impact factor: 2.830), Vol. 180, 2021, pp. 545 - 559
- J24 Nedunchezian, K., **Kang, C.**, and Aono, H. "A Numerical Analysis of the Effects of Wing Kinematics on Flapping Wing Aeroacoustics," *Journal of Sound and Vibration* (2018 impact factor: 3.123), Vol. 442, 2019, pp. 366 - 383
- J23 Raghu, S. L., **Kang, C.**, Whitehead, P., Takeyama, A., and Conners, R., “Static accuracy analysis of Vicon T40s motion capture cameras arranged externally for motion capture in constrained aquatic environments," *Journal of Biomechanics* (2018 impact factor: 2.576), Vol. 89, 2019, pp. 139–142
- J22 Medina, C. and **Kang, C.** "Analytical Solution to the Aeroelastic Response of a Two-dimensional Elastic Plate in Axial Potential Flow," *Journal of Fluid Mechanics* (2017 impact factor: 2.893), Vol. 845, R3, 2018
- J21 Arora, N., **Kang, C.**, Shyy, W., and Gupta, A. "Analysis of Passive Flexion in Propelling a Plunging Membrane using a Torsional Spring Model," *Journal of Fluid Mechanics* (2017 impact factor: 2.893), Vol. 857, pp. 562 – 604, 2018
- J20 Bluman, J. E., Sridhar, M., and **Kang, C.** "Passive Stabilization of Hovering Fruit Fly Models with Flexible Wings," *Journal of Royal Society Interface* (2017 impact factor: 3.355), Vol. 15, pp. 20180409, 2018
- J19 Bluman, J. E., Pohly, J., Sridhar, M., **Kang, C.**, Landrum, D. B., and Fahimi, F. "Achieving Bioinspired Flapping Wing Hovering Flight Solutions on Mars via Wing Scaling," *Bioinspiration & Biomimetics* (2017 impact factor: 2.727), Vol. 13, pp. 046010, 2018

- J18 **Kang, C.**, Cranford, J., Sridhar, M., Kodali, D., Landrum, D. B., and Slegers, N. "Experimental Characterization of a Butterfly in Climbing Flight," *AIAA Journal* (2017 impact factor: 1.556), Vol. 56, No. 1, 2018
- J17 Bluman, J. E., **Kang, C.**, and Shtessel, Y. "Control of a Flapping Wing Micro Air Vehicle: a Sliding Mode Approach," *Journal of Guidance, Control, and Dynamics* (2017 impact factor: 2.024), Vol. 41, No. 5, 2018, pp. 1223-1226
- J16 Pohly, J., Salmon, J. L., Bluman, J. E., Nedunchezian, K. and **Kang, C.**, "Quasi-steady versus Navier-Stokes Solutions of Flapping Wing Aerodynamics," *Fluids*, Vol 3, Nr. 4, 2018 (invited paper in a special issue "Bio-inspired Fluids"; guest editor: Dr. Haibo Dong)
- J15 Kodali, D., Medina, C., **Kang, C.** and Aono, H. "Effects of Spanwise Flexibility on Performance of the Flapping Flyers in Forward Flight," *Journal of Royal Society Interface*, Vol. 14, pp. 20170725, 2017
- J14 Bluman, J. E. and **Kang, C.** "Achieving hover equilibrium in free flight with a flexible flapping wing," *Journal of Fluids and Structures* (2017 impact factor: 2.434) Vol. 75, pp. 117-139, 2017
- J13 Bluman, J. E. and **Kang, C.**, "Wing-wake interaction destabilizes hover equilibrium of a flapping insect-scale wing," *Bioinspiration & Biomimetics*, Vol 12, 2017, pp. 046004
- J12 Kodali, D., and **Kang, C.**, "An Analytical Model and Scaling of Chordwise Flexible Flapping Wings in Forward Flight," *Bioinspiration & Biomimetics*, Vol 12, 2016, pp. 016006
- J11 Shyy, W., **Kang, C.**, Chirarattananon, P, Ravi, S., Liu, H. "Aerodynamics, Sensing, and Control of Insect-scale Flapping-Wing Flight," *Proceedings of Royal Society A* (2017 impact factor: 2.410), Vol. 472, 2016, pp. 20150712 (invited review paper)
- J10 Sridhar, M. K. and **Kang, C.**, "Aerodynamic Performance of Flexible Flapping Wings at Fruit Fly Scale in Hover Flight," *Bioinspiration & Biomimetics*, Vol 10, 2015, pp. 036007
- J9 **Kang, C.**, and Shyy, W., "Analytical model for instantaneous lift and shape deformation of an insect-scale flapping wing in hover," *Journal of Royal Society Interface*, Vol 11, 2014, pp. 20140933
- J8 Vandenheede, R., Bernal, L. P. B., Morrison, C., Gogulapati, A., Friedmann, P. P., **Kang, C.**, and Shyy, W., "Experimental and Computational Study on Flapping Wings with Bio-Inspired Hover Kinematics," *AIAA Journal*, Vol. 52, Nr. 5, pp. 1047 - 1058, 2014
- J7 **Kang, C.** and Shyy, W., "Scaling and Lift Generation of Hovering Flexible Wing of Insect Size," *Journal of Royal Society Interface*, Vol. 10, Nr. 85, 2013
- J6 **Kang, C.**, Aono, H., Baik, Y.S., Bernal, L.P., and Shyy, W., "Fluid Dynamics of Pitching and Plunging Flat Plate at Reynolds Number of $O(10^4)$," *AIAA Journal*, Vol. 51, No. 2, pp. 315-329, 2013
- J5 **Kang, C.**, Aono, H., Cesnik, C.E.S., and Shyy, W., "Effects of Flexibility on the Aerodynamic Performance of Flapping Wings," *Journal of Fluid Mechanics*, Vol. 689, pp. 32 - 74, 2011; also AIAA-2011-3121
- J4 Trizila, P., **Kang, C.**, Aono, H., Visbal, M., and Shyy, W., "Low-Reynolds-Number Aerodynamics of a Flapping Rigid Flat Plate," *AIAA Journal*, Vol. 49, No. 4, pp. 806 - 823, 2011
- J3 Shyy, W., Aono, H., Chimakurthi, S, Trizila, P., **Kang, C.**, Cesnik, C., and Liu, H., "Recent Progress in Flapping Wing Aerodynamics and Aeroelasticity," *Progress in Aerospace Sciences* (2017 impact factor: 4.729), Vol. 48, Nr. 7, pp. 284-327, 2010

- J2 Ol, M., Bernal, L., **Kang, C.**, and Shyy, W., "Shallow and Deep Dynamic Stall for Flapping Low Reynolds Number Airfoils," *Experiments in Fluids* (2017 impact factor: 2.195), Vol. 46, Nr. 5, pp. 883-901, 2009
- J1 Shyy, W., Trizila, P., **Kang, C.**, Aono, H., "Can Tip Vortices Enhance Lift of a Flapping Wing?," *AIAA Journal*, Vol. 47, pp. 289-293, 2009

Conference Papers and Presentations

- C41 Sridhar, M.K., Pohly, J., **Kang, C.**, Landrum, D.B., Lee, T., Aono, H., "Effects of Vein Structures on Fluid-structure Interaction of Flexible Flapping Wings at High Altitudes," AIAA-2021-0963, AIAA Scitech Forum, 11-15 & 19-21 January 2021, Virtual Event, 2020.
- C40 Tran, T., **Kang, C.**, Mathis, S., "Lower-Gait Tracking Mobile Application: A Case Study of Lower body Motion Capture Comparison Between Vicon T40 System and Apple Augmented Reality", IEEE International Conference on Bioinformatics & Biomedicine, 2020.
- C39 McCain, J., Pohly, J., Sridhar, M.K., **Kang, C.**, Landrum, D.B., Aono, H., "Experimental Force and Deformation Measurements of Bioinspired Flapping Wings in Ultra-Low Martian Density Environment", AIAA 2020-2003, AIAA Scitech, Orlando, FL, 6-10 January 2020
- C38 Dunne, S., Palma, G., Pohly, J., Mesmer, B., Landrum, D.B., **Kang, C.** "System Analyzer for a Bioinspired Mars Flight Vehicle System for Varying Mission Contexts," AIAA 2020-0665, AIAA Scitech, Orlando, FL, 6-10 January 2020
- C37 Twigg, R., Sridhar, M., Pohly, J., Hildebrandt, N., **Kang, C.**, Landrum, D.B., Roh, K., Salzwedel, S., "Aeroelastic Characterization of Real and Artificial Monarch Butterfly Wings," AIAA 2020-2002, AIAA Scitech, Orlando, FL, 6-10 January 2020
- C36 Sridhar, M.K., **Kang, C.**, and Lee, T., "Geometric Formulation for the Dynamics of Monarch Butterfly with the Effects of Abdomen Undulation," AIAA 2020-1962, AIAA Scitech, Orlando, FL, 6-10 January 2020
- C35 Sridhar, M.K., **Kang, C.**, Landrum, D.B., Aono, H., "Fluid-structure Interaction of Flexible Flapping Wings at High Altitude Conditions", AIAA 2020-1781, AIAA Scitech, Orlando, FL, 6-10 January 2020
- C34 Aono, H., Kikkawa, K., Ishikawa, H., and **Kang, C.**, "A Numerical Study of Sound Generation on Pitch and Plunge Wing at Low Reynolds Numbers", AIAA 2020-1495, AIAA Scitech, Orlando, FL, 6-10 January 2020
- C33 Sridhar, M.K., **Kang, C.**, and Landrum, D.B., "Beneficial Effect of the Coupled Wing-Body Dynamics on Power Consumption in Butterflies," AIAA 2019-0566, AIAA 2019 Scitech Forum, San Diego, California, January 7 - 11, 2019 (AIAA Atmospheric Flight Mechanics Best Student Paper)
- C32 Nedunchezian, K., **Kang, C.**, and Aono, H., "Sound Generation of Flexible Plunging Wings in Hover at Low Reynolds Numbers," AIAA 2019-1072, AIAA 2019 Scitech Forum, San Diego, California, January 7 - 11, 2019
- C31 Pohly, J., **Kang, C.**, Sridhar, M.K., Landrum, D.B., Fahimi, F., Mesmer, B., Bluman, J.E., Aono, H., Lee, T. "Scaling Bioinspired Mars Flight Vehicles for Hover," AIAA 2019-0567, AIAA 2019 Scitech Forum, San Diego, California, January 7 - 11, 2019
- C30 Sridhar, M.K., **Kang, C.**, Landrum, D.B., Wahidi, R., Lang, A. and Wilroy, J. " Numerical Investigation of Effects of Experimental Environment on Vortex Formation in Low Reynolds Number Flows," AIAA 2018-1080, 2018 AIAA Aerospace Sciences Meeting, Kissimmee, Florida, January 8 - 12, 2018
- C29 Nedunchezian, K., **Kang, C.**, and Aono, H. "A Numerical Analysis of the Effects of Wing Kinematics on Flapping Wing Aeroacoustics," AIAA 2018-0269, 2018 AIAA Aerospace Sciences Meeting, Kissimmee, Florida, January 8 - 12, 2018

- C28 **Kang, C., Sridhar, M.K.,** and Landrum, D.B. "Dynamic Relationship Between Flapping Wing and Body Undulation of Monarch Butterflies in Free Flight," AIAA 2018-0041, 2018 AIAA Aerospace Sciences Meeting, Kissimmee, Florida, January 8 - 12, 2018
- C27 **Pohly, J., Sridhar, M.K., Bluman, J. E., Kang, C.,** Landrum, D.B., Fahimi, F., Aono, H. and Liu, H., "Payload and Power for Dynamically Similar Flapping Wing Hovering Flight on Mars," AIAA 2018-0020, 2018 AIAA Atmospheric Flight Mechanics Conference, Kissimmee, Florida, January 8 - 12, 2018
- C26 **Bluman, J. E.,** Shtessel, Y., and **Kang, C.,** "Sliding Mode Control of a Biomimetic Flapping Wing Micro Air Vehicle in Hover," AIAA 2017-1633, AIAA Atmospheric Flight Mechanics Conference, Grapevine, Texas, January 9 - 13, 2017
- C25 **Salmon, J. L., Bluman, J. E., and Kang, C.,** "Quasi-steady versus Navier-Stokes Solutions of Flapping Wing Aerodynamics," AIAA 2017-0329, 55th AIAA Aerospace Sciences Meeting, Grapevine, Texas, January 9 - 13, 2017
- C24 **Kodali, D., Kang, C.,** and Aono, H. " An Analytical Aeroelastic Model of Spanwise Flexible Flapping Wings in Forward Flight," AIAA 2017-0331, 55th AIAA Aerospace Sciences Meeting, Grapevine, Texas, January 9 - 13, 2017
- C23 **Bluman, J. E., Kang, C.,** Landrum, D.B., Fahimi, F., and Mesmer, B. "Marsbee-Can a Bee Fly on Mars?," AIAA 2017-0328, 55th AIAA Aerospace Sciences Meeting, Grapevine, Texas, January 9 - 13, 2017
- C22 **Kang, C., Sridhar, M.K.,** Landrum, D.B., **Nakamura, Y.,** and Aono, H., "Effects of Altitude on the Flight Performance of Monarch Butterflies," AIAA 2017-0093, 55th AIAA Aerospace Sciences Meeting, Grapevine, Texas, January 9 - 13, 2017
- C21 Benson, K.L., Landrum, D.B., and **Kang, C.,** "Monarch Madness: A Cross-curricular Approach to Elementary STEM Education," AIAA 2017-0515, 55th AIAA Aerospace Sciences Meeting, Grapevine, Texas, January 9 - 13, 2017
- C20 **Bluman, J. E. and Kang, C.,** "Balancing the Efficiency and Stability of the Coupled Dynamics and Aerodynamics of a Flapping Flyer," AIAA 2016-4009, AIAA AVIATION, Washington, D.C., 13-17 June 2016
- C19 **Sridhar, M.K., Kang, C.,** and Landrum, D.B., " Instantaneous Lift and Motion Characteristics of Butterflies in Free Flight," AIAA 2016-3252, AIAA AVIATION, Washington, D.C., 13-17 June 2016
- C18 **Bluman, J. E., Sridhar, M. K., and Kang, C.,** " The Influence of Wing Flexibility on the Longitudinal Dynamics of a Flapping Wing Micro Air Vehicle in Hover," AIAA 2016-0470, 57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, San Diego, California, January 4-8, 2016
- C17 **Deepa, K. and Kang, C.,** " Analytical Aerodynamic Model of Chordwise Flexible Flapping Wings in Forward Flight," AIAA 2016-1064, 54th AIAA Aerospace Sciences Meeting, San Diego, California, January 4-8, 2016
- C16 **Cranford, J., Kang, C.,** Landrum, D.B., and Slegers, N. "Experimental Characterization of Butterfly in Climbing Flight," AIAA 2015-2328, AIAA AVIATION, Dallas, Texas, June 22-26, 2015
- C15 **Sridhar, M. K. and Kang, C.,** "Aerodynamic Performance of Flexible Flapping Wings at Bumblebee Scale in Hover Flight," AIAA 2015-0254, 53th AIAA Aerospace Sciences Meeting, Kissimmee, Florida, January 5-9, 2015

- C14 Sridhar, M. K. and **Kang, C.**, "Effects of Flexible Wings in Hover Flight at Fruit Fly Scale," AIAA 2014-2311, 44th AIAA Fluid Dynamics Conference, Atlanta, Georgia, June 16 - 20, 2014
- C13 **Kang, C.**, and Shyy, W., "A Quasi-Steady Model for the Lift on a Hovering Flexible Wing," AIAA 2014-1114, 52nd Aerospace Science Meeting, National Harbor, Maryland, January 13 – 17, 2014
- C12 **Kang, C.**, and Shyy, W., "Modeling of Instantaneous Passive Pitch of Flexible Flapping Wings," AIAA 2013-2469, 43rd AIAA Fluid Dynamics Conference, San Diego, California, June 24 – 27, 2013
- C11 Vandenheede, R.B.R, Bernal, L.P., Morrison, C., Gogulapati, A., Friedmann, P.P., **Kang, C.**, and Shyy, W., "Comparison of Experiments on Bio-Inspired Hover Kinematics with The Unsteady Vortex Model and CFD, " AIAA 2013-0066, 51th AIAA Aerospace Science Meeting Including the New Horizons Forum and Aerospace Exposition, Grapevine, Texas, January 7 – 10, 2013
- C10 **Kang, C.**, and Shyy, W., "Passive Wing Rotation in Flexible Flapping Wing Aerodynamics," AIAA-2012-2763, 30th AIAA Applied Aerodynamics Conference, New Orleans, Louisiana, June 25 - 28, 2012
- C9 **Kang, C.**, and Shyy, W., "Effects of Flexibility on the Aerodynamics of a Hovering Flexible Airfoil at Reynolds Number of 100 to 1000," AIAA-2012-1206, 50th AIAA Aerospace Science Meeting, Nashville, Tennessee, January 9 - 12, 2012
- C8 **Kang, C.**, Aono, H., Cesnik, C.E.S., and Shyy, W., "Effects of Flexibility on the Aerodynamic Performance of Flapping Wings," AIAA-2011-3121, 6th AIAA Theoretical Fluid Mechanics Conference, Honolulu, Hawaii, June 27-30, 2011
- C7 **Kang, C.**, Aono, H., Cesnik, C.E.S., and Shyy, W., "A Scaling Parameter for Thrust Generation of Flapping Flexible Wings," AIAA-2011-1313, 49th AIAA Aerospace Sciences Meeting, Orlando, Florida, 4 - 7 January 2011
- C6 Aono, H., **Kang, C.**, Cesnik, C.E.S., and Shyy, W., "A Numerical Framework for Isotropic and Anisotropic Flexible Flapping Wing Aerodynamics and Aeroelasticity," AIAA-2010-5082, 28th AIAA Applied Aerodynamics Conference, Chicago, Illinois, June 28-1, 2010
- C5 Trizila, P., **Kang, C.**, Aono, H., Visbal, M., and Shyy, W., "Fluid Physics and Surrogate Modeling of a Low Reynolds Number Flapping Rigid Flat Plate," AIAA 2010-5081, 28th AIAA Applied Aerodynamics Conference, 28 June - 1 July 2010, Chicago, Illinois
- C4 **Kang, C.**, Aono, H., Trizila, P., Baik, Y., Rausch, J.M., Bernal, L., Ol, M.V., and Shyy, W., "Modeling of Pitching and Plunging Airfoils of Reynolds Number between 1×10^4 and 6×10^4 ", AIAA-2009-4100, 27th AIAA Applied Aerodynamics Conference, San Antonio, Texas, June 22-25, 2009
- C3 **Kang, C.**, Baik, Y., Bernal, L., Ol, M.V., and Shyy, W., "Fluid Dynamics of Pitching and Plunging Airfoils of Reynolds Number between 1×10^4 and 6×10^4 ", AIAA-2009-536, 47th AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition, Orlando, Florida, Jan. 5-8, 2009
- C2 Trizila, P., **Kang, C.**, Visbal, M., and Shyy, W., "A Surrogate Model Approach in 2-D Versus 3-D Flapping Wing Aerodynamic Analysis", AIAA-2008-5914, 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Victoria, British Columbia, September, 2008
- C1 Trizila, P., **Kang, C.**, Visbal, M., and Shyy, W., "Unsteady Fluid Physics and Surrogate Modeling of Low Reynolds Number, Flapping Airfoils", AIAA-2008-3821, 38th Fluid Dynamics Conference and Exhibit, Seattle, Washington, June 2008

Conference Presentations

- 12 Pohly, J., Kang, C., Landrum, D.B., Bluman, J., Aono, H., “ CFD-informed Scaling of Bioinspired Mars Flight Vehicles for Hover”, AIAA-2021-0963, AIAA Scitech Forum, 11-15 & 19-21 January 2021, Virtual Event, 2020.
- 11 Pohly, J., McCain, J., Sridhar, M.K., Kang, C., Landrum, D.B., Mesmer, B.L., Bluman, J., Lee, T., Aono, H., “Marsbees: Bio-inspired Flapping Wing Flight Vehicles for Mars Exploration”, AIAA 2020-2003, AIAA Scitech, Orlando, FL, 6-10 January 2020, Invited oral presentation
- 10 Sridhar, M.K., Kang, C., Landrum, D. B., and Mathis, S. "The Role of Coupled Wing-Body Dynamics on Power Consumption in Butterflies," 2018 71th APS Division of Fluid Dynamics, Atlanta GA, November 18 – 20, 2018
- 9 Pohly, J., Bluman, J., Kang, C., Landrum, D. B., Aono, H., and Liu, H. "Lift and Power Required for Flapping Wing Hovering Flight on Mars," 2017 70th APS Division of Fluid Dynamics, Denver CO, November 19 – 21, 2017
- 8 Medina, C. and Kang, C. " Analytical Solution for the Aeroelastic Response of a Two-Dimensional Elastic Plate in Axial Flow," 2017 70th APS Division of Fluid Dynamics, Denver CO, November 19 – 21, 2017
- 7 Kang, C., Sridhar, M. K., Landrum, D. B., and Aono, H. "Effects of altitude on the climbing performance of Monarch butterflies," 2016 69th APS Division of Fluid Dynamics, Portland OR, November 20 – 22, 2016
- 6 Aono, H., Ozawa, Y., Yamamoto, M., Ishikawa, H., Kang, C., and Liu, H. "Effects of wing flexibility on sound characteristics of a four-wing flapping wing micro air vehicle," 5th Joint meeting, Acoustical Society of America and Acoustical Society of Japan, Honolulu Hawaii USA, 28 November – 2 December 2016
- 5 Shyy, W. and Kang, C., "Time-Accurate Estimate of Flexible Flapping Wing Aerodynamics," Invited Presentation, 7th World Congress of Biomechanics, Boston, Massachusetts, July 6 - 11, 2014
- 4 Shyy, W., Kang, C., and Cho, Y., “Adaptive and Passive Flow Control via Actuation and Flexible Structures at Low Reynolds Number,” 5th International Symposium on Fluid Machinery and Fluids Engineering, Jeju, Korea, October 24 – 27, 2012
- 3 Su, W., Kang, C., and Cesnik, C.E.S., "Nonlinear Aeroelastic Analysis of Flapping Wing Micro Air Vehicles with a Surrogate Aerodynamic Model," International Forum on Aeroelasticity and Structural Dynamics 2011, Paris, France, June 26–30, 2011
- 2 Kang, C., Aono, H., and Shyy, W., “Scaling in Flexible Flapping Wings,” American Physical Society, 64th Annual Meeting of the Division of Fluid Dynamics, Baltimore, Maryland, November 19 - 22, 2011
- 1 Saric, W., Reed, H., Kang, C., Gladden, R., Gabet, P., and Clevenger, D., "Supersonic Laminar Flow Control on Swept Wings Using Distributed Roughness Experiments,” American Physical Society, 54th Annual Meeting of the Division of Fluid Dynamics, San Diego, California, November 18 - 20, 2001

Professional Presentations and Workshops

- Hong Kong University of Science and Technology, Hong Kong, “Marsbee – Swarm of Flapping Wing Flyers for Enhanced Mars Exploration” July 5, 2019

- Chiba University, Japan, “Marsbee – Swarm of Flapping Wing Flyers for Enhanced Mars Exploration” June 26, 2019
- NIAC Inventive Genius Lecture: From Science Fiction to Science Fact, Chicago Museum of Science & Industry, “Marsbee – Swarm of Flapping Wing Flyers for Enhanced Mars Exploration” April 13, 2019
- NASA Innovative Advanced Concepts Symposium, Boston, MA, “Marsbee – Swarm of Flapping Wing Flyers for Enhanced Mars Exploration” September 25-27, 2018
- NASA HQ, Washington DC, “Marsbee – Swarm of Flapping Wing Flyers for Enhanced Mars Exploration” June 5-6, 2018
- Fluid-structure interaction workshop at the University of New South Wales in Canberra, Australia, “Analytical Solution for the Aeroelastic Response of a Two-Dimensional Elastic Plate in Axial Potential Flow”, May 7-9, 2018
- George Washington University, Washington DC, “High-altitude Effects on Butterfly Flight”, June 14, 2016
- University of Alabama, Tuscaloosa, AL, “Flapping Wing Aerodynamics of Monarch Butterflies”, Feb. 25, 2016
- UAH AIAA Student Chapter, Huntsville, AL, “Flapping Wing Aerodynamics of Monarch Butterflies”, Feb 2, 2016
- University of Maryland, MD, “Aerodynamics of Insect Flight”, July 10, 2015
- CFDRC, Huntsville, AL, “Scaling and Lift Generation of Flexible Flapping Wings”, Aug 30, 2013
- University of Alabama in Huntsville, Huntsville, AL, “Scaling and Lift Generation of Flexible Flapping Wings”, Apr 1, 2013
- Siemens Corporate Research, Princeton, NJ, “Multi-Physics from Flapping Wings Systems to Cardiac Mechanics”, Feb 21, 2013
- Korea Advanced Institute of Science and Technology, Daejeon, Korea, “Aerodynamics, Scaling, and Performance of a Flexible Flapping Wings”, Dec 22, 2011

Graduate Student Mentoring

PhD

- James E. Bluman. 2017
 - Dissertation title: “The effects of wing flexibility on the flight performance and stability of flapping wing micro air vehicles”
 - Currently: Assistant Professor at the United States Military Academy at West Point.
- Deepa Kodali. 2019
 - Dissertation title: “Analytical models of chordwise and spanwise flexible flapping wings in forward flight”
 - Currently: Postdoctoral Research Associate at the Tuskegee University.
- Madhu Sridhar. Graduation expected in 2021
- Jeremy Pohly. Graduation expected in 2021

MSc

- Madhu Sridhar. 2015
 - Thesis title: “Aerodynamic performance of flexible flapping wings at fruit fly and bumblebee scales in hover flight”.
 - Currently a PhD student at the University of Alabama in Huntsville
- Jacob Cranford. 2015 (co-advised with Dr. Nathan Slegers).
 - Thesis title: “A novel experimental method for studying trajectories and wing kinematics of freely flying butterflies”.
 - Currently a Research Engineer at Gloyer-Taylor Labs LLC.

- James L. Salmon. 2016
 - Thesis title: “A comparison of the quasi-steady to the Navier-Stokes equation solutions of flapping wing aerodynamics”.
 - Currently a Research Engineer at Aviation Training Consulting.
- Cory Medina, 2017
 - Thesis title: “A closed-form solution to the aeroelastic response of an elastic plate in axial flow”.
 - Currently a Research Engineer at Sandia National Lab
- Kabilan Nedunchezian. 2018
 - Thesis title: A Numerical Analysis of the Effects of Flapping Wing Kinematics on Aeroacoustics in Hovering Flight
- Shreyas Lakshmipuram Raghu. 2019
 - Thesis title: Kinematic Analysis of Gait in An Aquatic Treadmill using Land - Based Motion Capture Cameras
 - Currently a PhD student at the University of Alabama in Huntsville
- Jesse McCain. 2019
 - Experimental Force and Wing Motion Measurements of A Bioinspired Flapping Wing in A Martian Density Condition
 - Currently a Research Engineer at Dynetics
- Rachel Twigg. 2019
 - Aeroelastic Characterization of Real and Bioinspired Artificial Butterfly Wings
 - Currently a Research Engineer at Dynamic Concepts

Undergraduate Research Students:

- NSF REU: Raisa Chowdhury (Carnegie Mellon, 2015), M’hamed Ben Moussa (UAH, 2016), Munsa Manandhar (Emory University)
- UAH Research or Creative Experience for Undergraduates: Brittany Greene (Biology, 2016) Darnisha Crane (MAE, 2017)
- Lab Assistants: Yusuke Nakamura (MAE), Alex Christley (MAE), Pratik Bhardwaj (MAE), Nathaniel Long (MAE), Janelle Williams (ISEEM), Jeffrey Boudreau (MAE), Hunter Philips (MAE), Brittany Greene (Biology), Daniel Aiken (MAE), Ryota Nakano (MAE), Akifumi Takeyama (MAE), Ryo Suzuki (MAE), Nicholas Hildebrandt (MAE), Frederick Schulze (MAE), Madison Smith (MAE), Charity Wangari (MAE), Thomas Clark (MAE), Spencer Rubottom (MAE), Michael Wahl (MAE)

Teaching

University of Alabama in Huntsville

- 2013 Fall
 - MAE430/530, Fundamentals of Aerodynamics, Undergrad; Grad, 48 students, student instructor evaluation (SIE): undergrad: 90.45/100; grad: 98.52/100
- 2014 Spring
 - MAE693, Graduate Engineering Analysis II, Grad, 25 students, SIE: 87.04/100
 - MAE755, Advanced Aerodynamics, Grad, 2014S, 6 students, SIE: 91.11/100
- 2014 Fall
 - MAE430/530, Fundamentals of Aerodynamics, Undergrad; Grad, 43 students, SIE: Not administered by University
- 2015 Spring
 - MAE693/EE630, Graduate Engineering Analysis II, Grad, 25 students, SIE: MAE693: 3.47/4; EE630: 3.47/4; EE630 Online: 3.67/4
 - MAE695/610, Aerodynamics, Grad, 10 students, SIE: On-Campus 3.75/4; Online 3.5/4

- 2015 Fall
 - MAE430, Fundamentals of Aerodynamics, Undergrad, 27 students, SIE: 3.48/4
 - MAE695/610, Aerodynamics, Grad, 7 students, SIE: 4/4
- 2016 Spring
 - MAE695/620, Compressible Aerodynamics, Grad, 21 students SIE: On-Campus 4/4; Online 3.67/4
- 2016 Fall
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 57 students, SIE: 4.49/5
 - MAE695/610, Aerodynamics, Grad, 7 students, SIE: 5/5
- 2017 Spring
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 34 students, SIE: 4.47/5
 - MAE695/620, Compressible Aerodynamics, Grad, 11 students, SIE: 5/5
- 2017 Fall
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 52 students, SIE: 4/5
- 2018 Spring
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 37 students, SIE: 4.8/5
- 2018 Fall
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 37 students, SIE: 4.19/5
 - MAE610, Aerodynamics, Grad, 19 students, On-Campus: not enough input; Online: SIE: 4.64/5
- 2019 Spring
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 58 students, SIE: 3.16/5
 - MAE620, Compressible Flows, Grad, On-Campus: 12 students, SIE: 4.44/5; Online: 11 students, SIE: 4.25/5
- 2019 Fall
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 88 students, SIE: 3.94/5
 - MAE610, Aerodynamics, Grad, On-Campus: 6 students, SIE: 4.62/5; Online: 9 students, SIE: 3.31/5
- 2020 Spring
 - MAE330, Fundamentals of Aerodynamics, Undergrad, 56 students, SIE: 4.22/5
- 2020 Fall
 - MAE330, Fundamentals of Aerodynamics (fully online), Undergrad, 95 students, SIE: 4.27/5
 - MAE610, Aerodynamics (fully online), Grad: 14 students, SIE: 4.43/5

New curriculum development

- MAE695/610, Aerodynamics, Grad: Fundamental concepts in aerodynamics at a graduate level including conservation laws, complex potential theory, thin airfoil theories, finite-wing lifting-line theory, boundary layers and von Karman momentum integral equations.
- MAE695/620, Compressible Flow, Grad: Compressible, supersonic and transonic flow, as described by the Euler equations, at the graduate level. Linear and nonlinear theories of shock waves, expansion waves, and their interactions are studied.

Professional Service and Membership

- Associate Fellow – AIAA
- AIAA Fluid Dynamics Technical Committee member, 2018 – present
- Session Chairs: 2017 AIAA Aviation (Low-Re Flows and Bio-Inspired Flows); 2018 AIAA Aviation (Bio-Inspired Flows and Flow Instability); 2019 AIAA Scitech (Bio-inspired Aerodynamics I); 2019 AIAA Scitech (Unsteady Aerodynamics I); 2019 AIAA Aviation (Low

Re and Bio-inspired Flows, Fundamental Fluid Flows III: General); 2020 AIAA Scitech (Bio-Inspired and Low-Reynolds Number Flows I; Bio-Inspired and Low-Reynolds Number Flows II)

- Member – APS, The Royal Institution of Engineers in the Netherlands
- Reviewer: Journal of Fluid Mechanics, Journal of the Royal Society Interface, Journal of the Royal Society Interface Focus, Proceedings of the Royal Society A, Science Advances, AIAA Journal, Journal of Theoretical Biology, Bioinspiration & Biomimetics, Journal of Fluids and Structures, Journal of Aerospace Engineering, Aerospace Science and Technology, Aeronautical Journal, AIAA Conferences, International Federation of Automatic Control, American Helicopter Society Journal

University Service

- COE Strategic Planning - Leadership in Research Committee member, 2020 – present
- Reappointment and Tenure Promotion Committee member (MAE), 2020 – present
- First Year Reappointment Committee member (MAE), 2020 - present
- University Faculty Appeals Committee Alternate member, 2019 - present
- MAE High-school Promotion and Tour, 2019 – present
- Reappointment and Tenure Promotion Committee member (Civil), 2019
- Sigma Gamma Tau faculty advisor – University of Alabama in Huntsville, 2017 – present
- Faculty Search Committee member (MAE), 2014 – 2017
- Faculty Search Committee member (Kinesiology), 2016 – 2017
- Undergraduate Curriculum Committee member, 2013 – present