JIALEI SONG

Curriculum Vitae

CONTACT INFORMATION

Beijing Computational Science Research Center
Division of Mechanics
Zhongguancun Software Park II
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Haidian District, Beijing 10093

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RESEARCH INTERESTS

Theoretical and Computational Fluid Dynamics
High-performance Computing, Parallel Computing
Biomechanics, Biofluids
Fluid-Structure Interaction
Heat transfer, Thermal science
Control and Optimization
Immersed Boundary Method
Lattice Boltzmann Method

CURRENT POSITION

Joint Postdoctoral Fellow,
Chinese University of Hong Kong & Beijing Computational Science Research Center
Feb. 2016 – present

EDUCATION

Ph.D., Vanderbilt University, Nashville, Tennessee, USA
Department of Mechanical Engineering — Aug. 2011 – Jan. 2016

B.S., University of Science and Technology of China, Hefei, Anhui, China
Department of Modern Mechanics — Aug. 2007 – Jun. 2011

PUBLICATIONS

Papers in Peer-reviewed Journals

1. Tian, F.-B., Luo, H., **Song, J.**, Lu, X.-Y. Force production and asymmetric deformation of a flexible flapping wing in forward flight. *Journal of Fluids and Structures*, vol. 36, 149-161, 2013
2. **Song, J.**, Luo, H., Hedrick, T.L. Three-dimensional flow and lift characteristics of a hovering hummingbird. *Journal of the Royal Society Interface*, vol. 11 no. 98, 2014.
3. **Song, J.**, Luo, H., Hedrick, T.L. Wing-pitching mechanism of hovering Ruby-throated Hummingbirds. *Bioinspiration & Biomimetics*, vol. 10, 016007, 2015. (Selected as an featured article)
4. **Song, J.**, Luo, H., Hedrick, T.L. Performance of a quasi-steady model for hovering hummingbirds. *Theoretical & Applied Mechanics Letters*, vol.5, 2015
5. **Song, J.**, Luo, H., Tobalske, B.W. Hedrick, T.L. Computational modeling of aerodynamics in the fast forward flight of *calliope* hummingbird. *Submitted to Journal of the Royal Society Interface*
6. **Song, J.**, Massion, T.A., Luo, H., Hedrick, T.L. High-fidelity numerical analysis of mechanisms that *rufous* hummingbird adopt to achieve yaw turning. *In preparation*

Papers in Peer-reviewed Conference Proceedings

1. Luo, H., Dai, H., Adam Das S.S.M., **Song, J.**, Doyle J.F., Toward high-fidelity modeling of the fluid- structure interaction for insect wings, Proceedings of 50th AIAA Aerospace Sciences Meeting, Nashville, TN, Jan. 09-12, 2011

2. **Song, J.**, Luo, H., Hedrick, T.L. Flow characteristics of a hovering hummingbird, Proceedings of 43rd AIAA Fluid Dynamics Meeting, San Diego, CA, Jun. 24-27, 2013

3. **Song, J.**, Luo, H., Hedrick, T.L. Aerodynamic Performance of Hummingbird rufous During Hovering Flight, Proceedings of ASME District F Early Career Technical Conference, Birmingham, AL, Nov. 2-3, 2013

4. **Song, J.**, Luo, H., Hedrick, T.L. Comparison of CFD and quasi-steady analysis of hovering aero- dynamics for a Ruby-throated hummingbird, Proceedings of 44th AIAA Fluid Dynamics Meeting, Atlanta, GA, Jun. 16-20, 2014

5. **Song, J.**, Luo, H., Tobalske, B.W., Hedrick, T.L. Analysis of cruise flight of the calliope hummingbird hummingbird, Proceedings of 45th AIAA Fluid Dynamics Meeting, Dallas, TX, Jun. 22-26, 2015

Presentations and Posters

1. **Song, J.**, Luo, H., Hedrick, T.L. Aerodynamics of Hummingbird hovering flight. American Physical Society 65th Annual DFD Meeting, San Diego, CA, Nov. 18-20, 2012

2. **Song, J.**, Luo, H., Hedrick, T.L. Unsteady aerodynamics of hummingbird at hovering flight, Vanderbilt University Department of Mechanical Engineering seminar, Apr. 20th, 2013

3. **Song, J.**, Luo, H., Hedrick, T.L. Aerodynamic Performance of Hummingbird rufous During Hovering Flight, ASME District F Early Career Technical Conference paper, Birmingham, AL, Nov. 2-3, 2013

4. **Song, J.**, Luo, H., Hedrick, T.L. Comparison of CFD and quasi-steady analysis of hovering aero- dynamics for a Ruby-throated hummingbird, 44th AIAA Fluid Dynamics Conference paper, Atlanta, GA, Jun. 16-20, 2014

5. **Song, J.**, Luo, H., Tobalske, B.W., Hedrick, T.L. Analysis of cruise flight of the calliope hummingbird hummingbird, 45th AIAA Fluid Dynamics Conference, Dallas, TX, Jun. 22-26, 2015

6. **Song, J.**, Luo, H., Tobalske, B.W., Hedrick, T.L. Computational modeling of *calliope* hummingbird flying at $8m/s$ forward speed, APS Canadian-American-Mexican Graduate Student Physics Conference , Oaxaca, Mexico, Sep. 09-12, 2015 (Supported by APS travel awards)

Press

Our research results were featured in many mainstream media

1. Stockton, N., Science Graphic of the Week: Hummingbird Wing Aerodynamics, *WIRED*, Jul. 11th, 2014

2. Feltman, R., Hummingbirds actually fly more like insects, *Washington Post*, Nov. 24th, 2014

3. Tate, T., Small Birds, Big Science Hummingbirds and their biomechanics, *XSEDE News*, Aug. 28th, 2014

4. Salazar, J., Hummingbird Hovers for Supercomputer, *TACC Report*, Aug. 27th, 2014

5. Salisbury, D., How the hummingbird achieves its aerobatic feats, *Vanderbilt University Research News*, Nov. 21st, 2014

6. Hopton, J., Hummingbird's Hovering is Beautifully Complex, *RedOrbit*, Nov. 25th, 2014

7. Ossola, A., Watch this simulation of how the hummingbird flies, *MotherBoard*, Nov. 24th, 2014

8. Plesniak, M., Progress in fluid dynamics. *Aerospace America*, Dec. 2013

Skills

CFD modeling & **analysis:** Proficient in *parallel computing*, *supercomputing environment*, *fluid mechanics theory*
Numerical method: Proficient in *Finite Difference Method*, with intermediate skills in *Finite Element Method, Lattice Boltzmann Method*
Programming: Proficient in *FORTRAN*, *MATLAB* and *BASH*, with a knowledge of *Python* and *C language*.
Operation systems: Proficient in *Linux* and *Windows*
Commercial software: Proficient in *Tecplot* and *COMSOL*, with intermediate skills in *Abaqus*, *AutoCAD* and *SolidWorks*

Services

- Reviewer: Proceeding of American Institute of Aeronautics and Astronautics Fluid Dyanmics meeting
- Co-supervisor of a graduate student in Beijing Computational Science Research Center
- Co-supervisor of two high school student interns in the Computational Fluid Physics Lab, Jun. 2013−Aug. 2013, Dec. 2014−present
- Treasurer, Mechanical Engineering Student Graduate Association(MAGA), Vanderbilt Univeristy, Jan. 2013−Jan. 2014
- Lab management in the Computational Fluid Physics Lab, Vanderbilt University

Professional Affiliations

- American Physical Society (APS)
- American Institute of Aeronautics and Astronautics (AIAA)