Yi Liu (Steven)

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EDUCATION

University of Notre Dame, Notre Dame, IN

- Ph.D. student in Aerospace & Mechanical Engineering 2016 – Present
  - GPA: 4.0/4.0
  - Advisor: Prof. Meng Wang
  - Focus: computational fluid dynamics, turbulence, high-performance computing, aeroacoustics

Syracuse University, Syracuse, NY

- M.S. in Mechanical & Aerospace Engineering 2013 – 2015
  - GPA: 4.0/4.0
  - Advisor: Prof. Melissa Green
  - Focus: turbulence, dynamical system, geophysical fluid dynamics, high-throughput computing, GPU computing

Tongji University, Shanghai, China

- B.S. in Automotive Engineering 2007 – 2012
  - GPA: 86.21/100
  - Focus: transportation design, automotive aerodynamics, artificial neural network
- Visiting student in Industrial Design at College of Architecture and Urban Planning 2007 – 2009

EXPERIENCE

Research Assistant, Institute for Flow Physics and Control, University of Notre Dame 2016 – Present

Research Assistant, Green Fluid Dynamics Lab, Syracuse University 2014 – 2016

Computer Programmer, Core Infrastructure Services, Syracuse University 2015 – 2016

- Assisted researchers in Department of Biology by performing bioinformatics programming on OrangeGrid (a high-throughput computing environment on campus) for evolutionary biology researches.

SELECTED RESEARCH PROJECTS

Wall pressure fluctuations in compressible turbulent channel flows 2017 – Present

- Performing direct numerical simulations (DNS) and large-eddy simulations (LES) to investigate spatiotemporal characteristics of unsteady wall pressure in compressible channel flows.

Lagrangian coherent structures (LCS) in the Gulf Stream 2014 – 2018

- Developed programs to calculate the finite-time Lyapunov exponent (FTLE) and Lagrangian-averagedvorticity deviation (LAVD) to find LCS in the Gulf Stream region using altimeter data.
- Investigated the transport and mixing properties of the meandering jet and vortices, and the topological changesassociated with the structures.
- Code available at https://github.com/stevenliuyi/ocean-ftle.

Three dimensional LCS in a turbulent channel flow 2014 – 2016

- Computed 3D FTLE fields of the direct numerical simulation (DNS) results of a turbulent channel flow toinvestigate the 3D coherent structures.
- Adopted high-throughput computing (HTC) technique to speed up 3D calculations.
- Code available at https://github.com/stevenliuyi/3d-ftle.

GPU programming in CFD simulations 2015

- Compared GPU parallel (OpenCL framework) and CPU sequential computing in CFD simulations.
- Developed CFD codes to capture shock-waves and tested for two cases (a shock-tube flow simulation and a transonic nozzle flow simulation).
- Code available at https://github.com/stevenliuyi/gpu-cfd.

Aerodynamics of electric vehicles based on CFD and neural network 2012

- Combined artificial neural network, genetic algorithm and CFD simulation to develop a novel method to improve aerodynamics performance in the automobile design process.

PUBLICATIONS

Yi Liu, Melissa Green, Chris Wilson, Chris Hughes (2018). "Gulf Stream Transport and Mixing Processes via Coherent Structure Dynamics," *Journal of Geophysical Research: Oceans*, 123(4), 3014-3037.

PRESENTATIONS & ABSTRACTS

Yi Liu, Kan Wang, Meng Wang. "Computation of Wall Pressure Fluctuations in Compressible Turbulent Channel Flows," Mechanics and Applied Science Seminar, University of Notre Dame, Notre Dame, IN, USA. 18 Jan 2019 (scheduled).

Yi Liu, Kan Wang, Meng Wang. "Computation of Wall Pressure Fluctuations in Compressible Turbulent Channel Flows," 71st Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Atlanta, GA, USA. 18-20 Nov 2018.

Yi Liu, Chris Wilson, Melissa Green, Chris Hughes. "Gulf Stream Transport and Mixing Processes via Lagrangian Coherent Structure Dynamics," 2018 Ocean Sciences Meeting, Portland, OR, USA. 11-16 Feb 2018.

Chris Wilson, Yi Liu, Melissa Green, Chris Hughes. "Gulf Stream Transport and Mixing Processes via Coherent Structure Dynamics," European Geosciences Union General Assembly 2017, Vienna, Austria. 23-28 April 2017.

Chris Wilson, Yi Liu, Melissa Green, Chris Hughes. "An Update to the "Barrier or Blender" Model of the Gulf Stream, Based on Lagrangian Analysis of Aviso Altimetry," 2016 Ocean Sciences Meeting, New Orleans, LA, USA. 21-26 Feb 2016.

Yi Liu, Chris Wilson, Melissa Green, Chris Hughes. "Lagrangian Coherent Structures in the Gulf Stream," 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Boston, MA, USA. 22-24 Nov 2015.

HONORS & AWARDS

- Outstanding Graduate Student of Mechanical & Aerospace Engineering, Syracuse University 2015
  For ranking first in the program
- Member of Honor Society of Phi Kappa Phi 2014 – Present
- Graduate Student Scholarship, Syracuse University 2013 – 2015
- Outstanding Student Scholarship, Tongji Unversity 2008, 2009

[*Updated on 2018-12-07.*]