UNIVERSITY of HOUSTON

Department of Mathematics
Scientific Computing Seminar

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Extract and Separate Vortical Structures in Turbulent Flows

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1 PM- 2 PM
Room 646   PGH

Abstract: Turbulent flows and their modeling have found wide-ranging applications in various fields such as automobile engineering, drug development, the food industry, wind/tide energy harnessing, disease diagnosis, and more. However, the features and structures in turbulent flows are in different scales and often tangled with each other in space, posing significant challenges when it comes to extract and separate them for the understanding of the underlying mechanisms of turbulent flows. Among these different features and structures, vortical structures are particularly interesting to the experts, as they play a crucial role in characterizing important turbulent mechanisms. In this talk, I will provide an overview of several techniques developed by our research group for the extraction and separation of vortical structures in different turbulent flows. I will start with a brief introduction of two methods we proposed to separate large-scale structures. Then, I will focus on our recent work on the extraction and separation of hairpin vortices from the wall-bounded turbulent shear flow. Hairpin vortices are believed to be responsible for lifting materials and transporting energy from the bottom boundary upward. I will conclude the talk by highlighting the remaining challenges in turbulent flow analysis and visualization.

Bio:

Guoning Chen is an Associate Professor at the Department of Computer Science at the University ofHouston. He received his Ph.D. degree in Computer Science from Oregon State University in 2009. From2009 to 2012, he was a postdoc research fellow at the Scientific Computing and Imaging (SCI) Institute at the University of Utah. His research interests include data analysis and visualization, topology-basedmethods, turbulent flow analysis and visualization, geometric modeling, geometry processing, andphysics-based simulations. He is a recipient of an NSF CAREER award and a Junior Faculty Award for Excellence in Research from the College of Natural Science and Mathematics at the University of Houston. He also received a few best paper awards and honorable mention awards from IEEE PacificVisi and IEEE VIS conferences.

This seminar is easily accessible to persons with disabilities. For more information or for assistance, please contact the Mathematics Department at 743-3500.