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Information Science and Technology Seminar Speaker Series

Cristian Lalescu
Johns Hopkins University

DNS of Turbulence: Synchronization of Chaos and Refinement

Wednesday, July 24, 2013

3:00 - 4:00 PM

**Los Alamos Research Park, 2nd Floor,
Conference Room 203 A & B**

Abstract: Although chaotic dynamical systems are famously unpredictable, their evolution can --- somewhat surprisingly --- be recovered in all detail from only partial observations. This is possible due to the phenomenon of Chaos Synchronization (CS), a process wherein two or more chaotic systems adjust a given property of their motion to a common behavior, due to a coupling or to a forcing. Presently, one of the outstanding problems in turbulence is determining the length-scale of the smallest turbulent eddies. The Kolmogorov 1941 theory makes a specific prediction, but accumulated experimental and numerical evidence suggests that fluid turbulence develops scales considerably smaller than the Kolmogorov length. We present our observation of CS in numerical simulations of fluid turbulence, and we discuss how this phenomenon can be exploited in a spacetime database of hydrodynamic turbulence to study the problem of the smallest turbulent eddy.

Biography: Cristian C Lalescu received his bachelor's degree (in physics) from the University of Craiova (Romania) in 2006. He then spent a year at Universite Libre de Bruxelles (Belgium) through a student exchange program. In 2007 he started his PhD with one advisor (Daniele Carati) from Universite Libre de Bruxelles and one advisor from the University of Craiova (Bucur Dan Grecu), in a joint program between the two universities. The public defense of his thesis was on the 1st of July 2011, in Craiova, the title being ``Test Particle Transport in Turbulent Magnetohydrodynamic Structures''. Since then Lalescu has been at Johns Hopkins University as a postdoc, where he is working with Gregory Eyink (and others), as part of the Turbulence Database Group. He is currently working on simulations of incompressible Navier-Stokes turbulence, refinement of Navier-Stokes solutions, and Lagrangian statistics of incompressible magnetohydrodynamic turbulence.

For more information contact the technical host Curt Canada, cvc@lanl.gov, 665-7453 or James Ahrens, ahrens@lanl.gov, 667-5797.

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