

The Department of Mechanical Engineering/College of Engineering and Applied Sciences
Stony Brook University

Mechanical Engineering Seminar



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Lecture Title: A Laptop-Based Regional Climate Model Based on an Exact Solution of the 3D Navier-Stokes Equation

Friday, February 1, 2013 at 2PM, Room 173 Light Engineering Building

Abstract

The Navier-Stokes equation is the fundamental basis of fluid behavior, including the atmosphere. In the absence of an exact solution to this 200-year old problem, expensive computer effort is used to model climate, essentially by numerical brute force. In 2011, an exact solution to the equivalent to of the Jet Stream was published [Muriel, Results in Physics, 2 (2011)], peer reviewed by the physics community, with no scientific criticism to date. Some preliminary results will be shown to model the Jet Stream using a laptop. As a result of our analytic achievement, we leapfrog the conventional and traditional models. We now propose to improve our model for use by researchers who wish to prepare their own regional models to empower small international groups to examine the role of initial weather conditions and to study the role of the well-known “butterfly effect” in climate change. A description of the modest resources needed, including graduate students, will be presented to encourage several regional modelers, instead of relying on massive computer facilities which are few in number. A revolution in climate modeling is expected.

Biography

Amador Muriel is gradually returning to academia after twenty-five years of European information technology consultancies, all the while pursuing a personal program of research on turbulence, hosted intermittently at the Institute for Advanced Study in Princeton, Max Planck Institute for Complex Systems in Dresden, and CERN. His company, based in Geneva, has funded his research on turbulence, culminating in a book, (Muriel, Quantum Nature of Turbulence, Nova Scientific Publishers, New York, 2010), to be followed in 2013 by a more definitive Quantum Theory of Turbulence. The books reprint refereed papers from European journals -- Physica A, Physica D, Physics Letters A, and American journals -- Physical Review and Physical Review Letters. At the time, Muriel felt that no funding agency would support his ideas on turbulence. But encouraged by his results, Muriel decided to retire from industry and pursue an academic career, starting with visiting appointments at Columbia University and Harvard University. At Harvard, he found an exact solution to the 3D Navier-Stokes equation, invited, refereed and published as the inaugural paper of Results in Physics, 2 (2011). It is yet to be vetted by the Bulletin of the American Mathematical Society for candidacy for the Millennium Prize of the Clay Institute of Mathematics. But from the physics perspective, the paper is already quite useful in continuing his research program.

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