

IMI Distinguished Lecture Series

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The challenge of making accurate predictions of fluid motion

William J. Layton

Department of Mathematics, University of Pittsburgh

Among fields of mathematics, fluid mechanics is one of the oldest and has one of the highest impacts on human life. The fundamental problem in the numerical analysis of fluid motion is to determine what is predictable (in theory) and how to predict it (in practice) within time and resource

constraints.

This talk will present recent work addressing how to make better predictions within (human and computer) time and (memory, computational and cognitive) complexity constraints. Part of the talk involves better models of turbulence. Part involves addressing the limits on ensemble sizes (currently $O(5)$ for long time, large domain simulations and $O(16)$ for short time small domains). Part will describe errors in the (currently mostly low level) time stepping methods used in practice.

New questions lead to new algorithms and new algorithms lead to new models and more questions. The talk will also present some open questions where progress may be possible in the near future.

Grad students who understand how to calculate the kinetic energy balance of the Navier-Stokes equations should be able to follow the talk.

This talk is based on joint work with Nan Jiang, Missouri S&T, and University of Pittsburgh PhD students Michael McLaughlin, Victor DeCaria, Ahmet Guzel, Ali Pakzad, Haiyun Zhao and Joe Fiordelino.

Brief Bio

Dr. Layton is a full professor in the Department of Mathematics at the University of Pittsburgh. His research involves novel algorithms, models and analysis aimed at understanding fluid motion. He has authored more than 160 refereed publications, 1 undergrad text, 1 grad text and 2 research monographs. He has advised numerous MS students and undergraduate student researchers and directed close to 40 PhD students, many of which have won awards for their high quality thesis research, have gone on to tenure track positions at research universities, and are now producing their own excellent PhD students.

Outside of mathematics, he was chess champion of Georgia in 1976 and is currently an avid mid-level whitewater kayaker, getting many mathematical ideas from observations of turbulent flows in nature!

For more information about Dr. Layton, please visit: <http://www.math.pitt.edu/~wjl/>

To learn more about the IMI Distinguished Lecture series, see: <http://imi.cas.sc.edu/events/distinguished-lecture-series/>

FRIDAY

March

23

3:30 - 4:30 PM

LeConte College

Room 412

Refreshments at 3:00 PM

Wyman L. Williams Room

