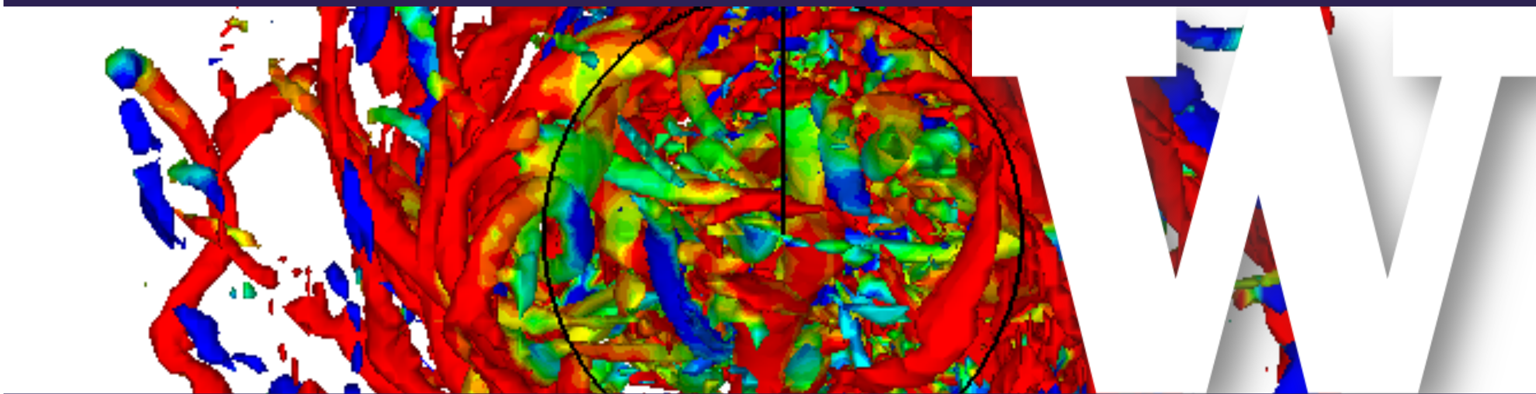

UW A&A PRESENTS:
CHAIR'S DISTINGUISHED SEMINAR SERIES

DR. KARTHIK DURAISAMY
UNIVERSITY OF MICHIGAN

Assistant Professor, Department of Aerospace Engineering

Director, Center for Data-Driven Computational Physics
University of Michigan, Ann Arbor

A PARADIGM FOR DATA-INFORMED MODELING
of Multi-Scale Problems

DEMONSTRATING: *Modeling of transitional and turbulent flows.*

MAR. 08 2016 / 1:30-2:20PM / GUG 220 / UW SEATTLE CAMPUS
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DEPARTMENT OF AERONAUTICS & ASTRONAUTICS

UW A&A CHAIR'S DISTINGUISHED SEMINAR SERIES

DR. KARTHIK DURAISAMY, UMICH

ABSTRACT:

The pursuit of accurate predictive models is a central issue and pacing item in many scientific and engineering disciplines. With the recent growth in computational power and measurement resolution, there is an unprecedented opportunity to use data from fine-scale simulations, as well as critical experiments, to inform, and in some cases even define predictive models. In this talk, a paradigm is introduced with the goal of comprehensively harnessing data to aid the creation of improved models for computational physics applications. Field inversion is used to obtain spatio-temporally distributed functional terms that directly address discrepancies in the structural form of the model. Once the inference has been performed over a number of problems that are representative of the underlying physics, machine learning techniques are used to reconstruct the functional corrections in terms of variables that appear in the closure model. These reconstructed functional forms are then used to augment the closure model in a predictive computational setting.

As demonstrative examples, modeling of transitional and turbulent flows is presented. The final part of the talk will provide a brief overview of the hardware ecosystem that is being developed at the University of Michigan to enable the paradigm of large-scale data-driven model development for computational physics applications.

SPEAKER BIO:

Karthik Duraisamy obtained a dual degree (PhD in Aerospace Engineering and MS in Applied Mathematics) from the University of Maryland, College Park. Prior to his appointment in 2013 at the University of Michigan, he spent time at Stanford University and the University of Glasgow (Scotland). At the University of Michigan, he directs the Center for Data-driven Computational Physics, which is focused on achieving data-driven solutions to complex multi-physics problems in many fields. His other research interests are in turbulence modeling and simulations, numerical methods and applied aeromechanics.

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