1150-65-166 **Traian Iliescu*** (iliescu@vt.edu), 428 McBryde Hall, Blacksburg, VA 24061. *Data-Driven Correction for Reduced Order Modeling of Nonlinear Systems.*

In this talk, we address the following question: Given a nonlinear equation u' = f(u) and a basis of fixed dimension r, what is the best Galerkin model of dimension r? We present the answer proposed by our group for reduced order models (ROMs), supporting numerical results, and open questions.

Specifically, we propose a data-driven correction ROM (DDC-ROM) framework, which can be formally written as DDC-ROM = Galerkin-ROM + Correction. To minimize the new DDC-ROM's noise sensitivity, we use the maximum amount of classical projection-based modeling and resort to data-driven modeling only when we cannot use the projection-based approach anymore (i.e., for the Correction term). The resulting minimalistic data-driven ROM (i.e., the DDC-ROM) is more robust to noise than standard data-driven ROMs, since the latter employ an inverse problem (which is sensitive to noise) to model all the ROM operators, whereas the former solves the inverse problem only for the Correction term.

We test the novel DDC-ROM in the numerical simulation of a 2D channel flow past a circular cylinder at Reynolds numbers Re = 100, Re = 500, and Re = 1000. (Received July 07, 2019)