

**COLLOQUIUM**  
**UNIVERSITY OF PITTSBURGH**  
**FRIDAY, SEPTEMBER 15, 2017**  
**704 THACKERAY HALL**

3:30 P.M.

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**A NEW CLASS OF LINEAR, DECOUPLED,  
ENERGY STABLE SCHEMES FOR GRADIENT FLOWS**

**ABSTRACT:** Many dynamical physical processes can be described by gradient flows. In this talk, I shall start by reviewing existing approaches for constructing energy stable schemes for gradient flows, then I'll introduce the new scalar auxiliary variable (SAV) approach which will allow us to construct linear, decoupled, energy stable schemes for a large class of gradient flows. The new class of schemes constructed by using the SAV approach enjoy the following advantages: (i) at each time step, one only has to solve decoupled, linear positive definite systems with constant coefficients; (ii) it is proved to be unconditionally energy stable and appears to be quantitatively more accurate than existing schemes of the same order; (iii) it applies to a wider class of problems.

As examples of application, I shall use the SAV approach to construct efficient and accurate energy stable schemes for several challenging gradient flows that can not be easily handled by the existing approaches.

**Refreshments served at 3:00 p.m.**  
**in the Math Dept. COMMON ROOM, Thackeray 705**