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Chun Liu (cliu124@iit.edu) and **Yiwei Wang*** (ywang487@iit.edu). *Variational numerical schemes of generalized gradient flows and beyond.*

In this talk, we present a systematic framework for deriving variational numerical schemes for generalized diffusions and gradient flows. The proposed numerical framework is based on the energy-dissipation law, which describes all the physics and the assumptions in each system and can combine various types of spatial discretizations including Eulerian, Lagrangian, and particle approaches. The resulting semi-discrete equation inherits the variational structures from the continuous energy-dissipation law. As examples, we apply such an approach to construct variational Lagrangian schemes to porous medium type generalized diffusions and Allen-Cahn type phase-field models, and particle methods for variational inference. Numerical examples demonstrate the advantages of our numerical approach. (Received January 23, 2022)