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Variational Lagrangian Scheme for the Porous Medium Equation and Phase-field models: A Discrete Energetic Variational Approach YI-WEI WANG, CHUN LIU, Illinois Institute of Technology — In this talk, we present a systematic framework of deriving variational schemes for generalized diffusions and gradient flows, by a discrete energetic variational approach, which performs an energetic variational approach (EnVarA) at a semi-discrete level. The resulting semi-discrete equation inherits the variational structures from the continuous energy-dissipation law directly. In particular, we apply such an approach to construct variational Lagrangian schemes to the porous medium type generalized diffusion and the Allen-Cahn type phase-field models. Numerical examples show the advantages of our schemes in capturing singularities, thin diffuse interfaces, and free boundaries. This is joint work with Professor Chun Liu (IIT).

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