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Stable discretization of gradient-flow diffuse-interface models

In this talk I will consider nonlinear parabolic PDE systems with diffuse interfaces, which exhibit a gradient-flow structure, e.g., Cahn-Hilliard-type models. Owing to the gradient structure, the evolution is fully described by an energy functional and dissipation operator. Crucial for its discretization are so-called gradient-stable schemes, which preserve the gradient structure at the time-discrete level. I will present a recently proposed 2nd-order gradient-stable scheme based on convex splitting and artificial stabilization. Numerical examples will be given with application to a gradient-flow tumor-growth model.