A Lagrangian scheme for the solution of nonlinear diffusion equations

Bertram Düring
University of Warwick
bertram.during@warwick.ac.uk

Many nonlinear diffusion equations can be interpreted as gradient flows whose dynamics are driven by internal energies and given external potentials. Examples include the heat equation, the porous medium equation, and the fourth-order Derrida-Lebowitz-Speer-Spohn equation. When solving these equations numerically, schemes that respect the equations' special structure are of particular interest. I this talk we present a Lagrangian scheme for nonlinear diffusion equations. For discretisation of the Lagrangian map, we use a finite subspace of linear maps in space and a variational form of the implicit Euler method in time. We present numerical experiments for the porous medium equation in two space dimensions.