

Discrete-to-continuum limit for reaction-diffusion systems via variational convergence of gradient systems

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This talk is about a convergence result for the spatial discretization of a reaction-diffusion system. The approximation is based on a homogeneous lattice, where in each node a reaction-ODE system describes the evolution of the concentrations, and where the transport between the different lattice nodes is given by additional exchange reactions. Assuming detailed balance, this large coupled reaction system can be understood as a (generalized) gradient flow characterized by cosh-type dissipation potentials and the relative entropy. Sending the lattice width to zero, we show how the limit reaction-diffusion-PDE system can be recovered with variational methods and an energy-dissipation principle.

The talk is based on joint work with Alexander Mielke and Artur Stephan.