

Asymptotic Behavior of systems of PDE arising in physics and biology:
theoretical and numerical points of view (ABPDE III)

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On a Cross-Diffusion model for Multiple Species with Nonlocal Interaction and Size Exclusion

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In this talk we study a PDE model for two diffusing species interacting by local size exclusion and global attraction. This leads to a nonlinear degenerate cross-diffusion system, for which we provide a global existence result as well as a uniqueness proof in the case of equal diffusivities. The analysis is motivated by the formulation of this system as a formal gradient flow for an appropriate energy functional consisting of entropic terms as well as quadratic nonlocal terms. Key ingredients are entropy dissipation methods as well as the recently developed boundedness-by-entropy principle. Moreover, we investigate phase separation effects inherent in the cross-diffusion model by an analytical and numerical study of minimizers of the energy functional and their asymptotics to a previously studied case as the diffusivity tends to zero.

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