PIMS/AMI Mathematical Biology Seminar

Monday, October 3, 2011
3 pm – 657 CAB
Philippe Laurençot

Applied Mathematics Institute

. . . the backbone of science!

Self-similar solutions to a kinetic model for grain growth

We prove the existence of self-similar solutions to the Fradkov model for two-dimensional grain growth, which consists of an infinite number of nonlocally coupled transport equations for the number densities of grains with given area and number of neighbours (topological class). For the proof we introduce a finite maximal topological class and study an appropriate upwind-discretization of the time dependent problem in self-similar variables. We first show that the resulting finite dimensional differential system has nontrivial steady states. Afterwards we let the discretization parameter tend to zero and prove that the steady states converge to a compactly supported self-similar solution for a Fradkov model with finitely many equations. In a third step we let the maximal topology class tend to infinity and obtain self-similar solutions to the original system that decay exponentially. Finally, we use the upwind discretization to compute self-similar solutions numerically. (joint work with Michael Herrmann and Barbara Niethammer)