Kinetic models for Chemotaxis

Fabio A. C. C. Chalub

University of Vienna

Abstract: Kinetic models for chemotaxis, nonlinearly coupled to a Poisson equation for the chemo-attractant density, are considered. Under suitable assumptions on the turning kernel (including models introduced by Othmer, Dunbar and Alt), convergence in the macroscopic limit to a drift-diffusion model is proven. The drift-diffusion models derived in this way include the classical Keller-Segel model. Furthermore, sufficient conditions for kinetic models are given such that finite-time-blow-up does not occur. Examples are given satisfying these conditions, whereas the macroscopic limit problem is known to exhibit finite-time-blow-up. This is a joint work with Peter Markowich, Christian Schmeiser and Benoit Perthame.