Boundedness vs. blow-up in a chemotaxis system

Dirk Horstmann Michael Winkler

Abstract

We determine the critical blow-up exponent for a Keller-Segel type chemotaxis model, where the chemotactic sensitivity equals some nonlinear function of the particle density. Assuming some growth conditions for the chemotactic sensitivity function we establish an a priori estimate for the solution of the problem considered and conclude the global existence and boundedness of the solution. Furthermore, we prove the existence of solutions that become unbounded in finite or infinite time in that situation where this a priori estimate fails.

Key words: Chemotaxis, global existence, blow-up in finite or infinite time, critical blow-up exponent

MSC 2000: 35K50, 35K57, 35K60, 92C17