



GLOBAL EXISTENCE AND BLOW-UP FOR A DEGENERATE PARABOLIC SYSTEM WITH NONLOCAL SOURCE

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Abstract

This paper investigates the global existence and blow-up of nonnegative solutions of the nonlocal degenerate parabolic system

u_t = Delta u^m + || uv ||_alpha^p, v_t = Delta v^n + || uv ||_beta^q, (x, t) in Omega x (0, T)

with homogeneous Dirichlet boundary data. By using the super- and sub-solution techniques, the critical exponent of the system is determined. Namely, if p_c = pq - (m - p)(n - p) < 0 every nonnegative solution is global, whereas if p_c > 0, there exist both global and blow-up nonnegative solutions. When p_c = 0, we show that if the domain Omega is sufficiently small, every nonnegative solution is global while if the domain large enough that is, if it contains a sufficiently large ball and initial data is sufficiently large, there exists no global solution.

Keywords and phrases: nonlocal source, degenerate parabolic system, global existence, blow-up.

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