

第 110 回 広島数理解析セミナー (2007 年度)

Hiroshima Mathematical Analysis Seminar No.110

日時 : 7月13日(金) 16:30~17:30

場所 : 広島大学理学部 B707

講師 : Nikos Kavallaris 氏 (大阪大学)

題目 : On the finite-time blow-up of a non-local parabolic equation describing chemotaxis

要旨 : The non-local parabolic equation

$$v_t = \Delta v + \frac{\lambda e^v}{\int_{\Omega} e^v} \quad \text{in } \Omega \times (0, T)$$

associated with Dirichlet boundary and initial conditions is considered here. In case $\Omega \subset \mathbb{R}^2$, this equation is a simplified version of the full chemotaxis system. Let λ^* be such that the corresponding steady-state problem has no solutions for $\lambda > \lambda^*$ then it is expected that blow-up should occur in this case. In fact, for $\lambda > \lambda^*$ and any bounded domain Ω it is proven that $\int_{\Omega} e^{v(x,t)} dx \rightarrow \infty$ as $t \rightarrow T_{max} \leq \infty$. Moreover, in this case, some properties of the blow-up set are provided. For the radial symmetric problem, i.e. when $\Omega = B(0, 1)$, where it is known that $\lambda^* = 8\pi$, we prove that v blows up in finite time $T^* < \infty$ for $\lambda > 8\pi$ and this blow-up occurs only at the origin $r = 0$ (single-point blow-up, mass concentration at the origin).

広島数理解析セミナー幹事

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