


复旦大学数学科学学院
数学综合报告会

报告题目：On a Keller-Segel System of Chemotaxis with Density-suppressed Motility

报告人：江杰 (中国科学院精密测量科学与技术创新研究院)

时间：2021-07-21 星期三 09:30-10:30

地点：腾讯会议会议号:575 979 383

，

报告摘要：

In this talk, we would like to report our recent work on a Keller-Segel system of chemotaxis, featuring a density-suppressed motility. This model was originally proposed by Keller and Segel in their seminal work in 1971, which models the cellular movements due to a local sensing chemotaxis. An extended model was also developed in some recent works of Biophysics to study the process of pattern formation, involving a density-suppressed motility, which stands for a repressive effect of the signal on cell motility. From a mathematical point of view, the model features a signal-dependent motility, which may vanish as the concentration becomes unbounded, leading to a possible degenerate problem. Conventional energy methods can only deal with some special cases and the existence of classical solutions with generic motility functions is a long standing open problem. Recently, we develop a new comparison method based on the nonlinear structure which provides us an explicit point-wise upper bound estimate for the concentration. Then, we study the global existence of classical solutions and discuss their boundedness in any dimensions. In particular, a critical mass phenomenon as well as an infinite-time blowup was verified in the two-dimensional case. The talk is based on recent joint works with Kentarou Fujie (Tohoku University), Philippe Laurençot (University of Toulouse and CNRS), and Yanyan Zhang (ECNU).

非线性数学模型与方法教育部重点实验室
中法应用数学国际联合实验室
上海市现代应用数学重点实验室
复旦大学数学研究所