

國立清華大學數學系學術演講

NTHU MATH Colloquium

- 講題 Singularities in the Keller-Segel system
- 講者 Prof. Van Tien Nguyen (National Taiwan University)
- 時間 2023.10.16 (Mon.) 16:00 – 17:00
- 地點 第三綜合大樓**2樓 Room 201**
- 茶會 15:30, Room 707

Abstract

The talk presents constructions of blowup solutions to the Keller-Segel system in \mathbb{R}^d .

- $d = 2$ (L^1 -critical): There exist finite time single blowup solutions that are of Type II with finite mass. Blowup rates are quantized according to a discrete spectrum of a linearized operator around the rescaled stationary solution in the self-similar setting. There is also multiple collapsing blowup solutions formed by a collision of multiple single solutions with self-similarity that provides a brand new mechanism of singularity formation.
- $d \geq 3$ (L^1 -supercritical): For $d \geq 3$, there exist finite time blowup solutions having the form of collapsing-ring which consists of an imploding, smoothed-out shock wave moving towards the origin to form a Dirac mass at the singularity. For $d = 3, 4$, we found blowup solutions with infinite mass that are asymptotically self-similar with a log-correction to its profile.

The constructions rely on spectral approach for multiple-scale problems, renormalization technique and refined energy estimates. The talk is based on a series of joint works with C. Collot (Paris Cergy), T. Ghoul (NYU Abu Dhabi), N. Nouaili (Paris Dauphine), N. Masmoudi (NYU) and H. Zaag (Paris Nord).