中国科学院数学与系统科学研究院

应用数学研究所

华罗庚应用数学青年论坛

报告题目： Perturbation of TASEP: infinite order transition in the slow bond problem

报 告 人： 张灵夫 博士

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时　　间： **2023 年 6 月 26 日 (星期一) 上午 10:30--11:30**

地　　点： 数学与系统科学研究院 **613 室**

摘　　要： Whether a localized microscopic defect will affect the macroscopic behavior of a system is a fundamental question in statistical mechanics. For the Totally Asymmetric Simple Exclusion Process (TASEP), a central model in the KPZ universality class, this problem is known as the 'slow-bond problem' and was originally posed by Janowsky and Lebowitz in the 90s: if the jump rate across one bond is decreased from 1 to 1-ε, is this effect detectable in the macroscopic current? Different groups of physicists, using a range of heuristics and numerical simulations, reached opposing conclusions. This problem was ultimately answered affirmatively in Basu-Sidoravicius-Sly for any positive ε. We then aim to more precisely understand the effect of the slow bond as ε tends to 0. We show that the slow-down effect in the macroscopic current, as a function of ε, is smaller than any polynomial. This explains why it was so challenging to predict on the basis of numerical simulations. Our proof focuses on the Last Passage Percolation formulation of TASEP, and uses geometric and probabilistic arguments (instead of exact formulas). This is based on joint work with Sourav Sarkar and Allan Sly.

个人简介： Lingfu Zhang obtained B.S. in Math. and B.S. in Comput. Sci. from MIT (2017), and Ph.D. in Math. from Princeton University (2022). His research is in the area of probability, and he has published in Ann. Prob., Prob. Theor. Rel. Fields, Comm. Math. Phys, Adv. Math., Duke Math. J., etc. His awards and honors include: 2022 Miller Fellow, UC Berkeley; 2017 Centennial Fellowship, Princeton University; 2016 The Hartley Rogers Jr. Prize, MIT; 2015 Putnam Fellow, the 75th William Lowell Putnam Math. Competition; 2013 Gold Medal, 54th Inter. Math. Olympiad (IMO).