



The Fermi-Pasta-Ulam system and the Korteweg-de-Vries equation: A low-regularity continuum limit

报告人: Prof. Dr. Herbert Koch
(University of Bonn/德国波恩大学)

时间: 周四, 2026 年 9 月 10 日 14:10-15:10

线下报告地点: 文萃楼 E, 七楼报告厅

摘要: For the infinite Fermi-Pasta-Ulam (FPU) system, general solutions can be approximated by counter-propagating waves associated with solutions to the Korteweg-de Vries (KdV) equation as the lattice mesh size goes to zero. The Toda lattice is a special case of the FPU system. We show that, by exploiting the conservation of the FPU Hamiltonian, the continuum limit from the FPU system to the KdV equation with L^2 -level initial data holds in appropriate norms on an arbitrary time interval, thereby answering an open question posed by Hong, Kwak, and Yang (2021). Moreover, for the local-in-time continuum limit of the FPU system to the KdV equation, we lower the required Sobolev regularity to H^s with $s > -3/4$. To establish this low-regularity continuum limit, we prove key trilinear estimates that are sharp up to the endpoint by combining linear estimates, the transversality of characteristic curves, and multilinear dispersive smoothing properties of the linear FPU flow.

This is joint work with Ruoyuan Liu.

报告人简介: Herbert Koch 是德国波恩大学数学系教授, 国际著名的调和分析与微分方程专家。主要研究领域包括调和与分析、色散方程和流体方程解的适定性理论和长时间行为以及反问题等。Koch 教授在包括 Publ. Math. IHES, Duke Math, CPAM, JEMS 在内的顶尖数学杂志上发表论文 90 余篇。