

The College of Arts & Sciences
Department of Mathematical Sciences

Colloquium

Professor Adrian Lam

The Ohio State University

Thursday, September 28th 2023

Room 220, 60W Charlton

4:00 – 5:00 pm

The nonlocal selection of spreading speed in shifting environments

Since the work of [Potapov & Lewis, 2004] and [Berestycki et al. 2009], there has been a lot of interest in the population dynamics driven by climate change, particularly the persistence and invasion of species as their suitable habitat are shifting poleward. In this project, we study the asymptotic spreading of Kolmogorov-Petrovsky-Piskunov (KPP) fronts in heterogeneous shifting habitats, with any number of shifting speeds, by further developing the method based on Hamilton-Jacobi equations due to Freidlin, Evans and Souganidis. Based on this approach, we derive the underlying Hamilton-Jacobi equations (HJE) which is can be linked to geometric optics in heterogeneous media. As applications, we observe that for the classical Fisher-KPP equation with shifting heterogeneity, the spreading speed is no longer determined by the formula $2\sqrt{rd}$, i.e. it may sometimes exceed the level predicted by local conditions. An explanation behind the nonlocal mechanism behind the speed enhancement will be given. Some related works, motivated by the conjecture of Shigesada et al. concerning the co-invasion of several competing species into an open space, will also be mentioned.

Refreshments will be served 3:15 – 3:45 pm in the Faculty Lounge
4118 French Hall West

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