

Adaptive evolution and concentrations in nonlocal PDEs

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Living systems are subject to constant evolution through the three processes, stated by C. Darwin, of population growth, selection and mutations. The goal of this series of lectures is to formalize them in a self-contained mathematical formalism. Examples include: resistance to treatment, monomorphism vs dimorphism, polymorphism and continuous distribution of traits, selection with lower proliferation, evolution of dispersion. Mathematical methods are based on singular perturbations, constrained Hamilton-Jacobi equations, effective Hamiltonians.

Ch 1. Principles of adaptation/evolution modeling. The constrained Hamilton-Jacobi equations

Ch 2. Dynamics of the fittest trait and ESS

Ch 3. Generalist or specialist?

Ch 4. Evolution without proliferating advantage