

Filling the gap between individual-based evolutionary models and Hamilton-Jacobi equations

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Long-term ecological or evolutionary dynamics may be strongly influenced by small subpopulations and local extinction in particular areas of (physical or phenotypical) space. Deterministic models which are derived as large population approximations of stochastic individual based models do not usually take into account such small subpopulation effects. We address this question in the study of eco-evolutionary dynamics of populations in a small mutational variance regime. In this regime, Hamilton-Jacobi equations have been emerged from asymptotic analyses of integro-differential evolutionary models, which are themselves derived from large population approximations of stochastic individual based models. In this work, we derive such a Hamilton-Jacobi equation, directly from a stochastic individual based model. This derivation allows a better understanding of the results obtained by the Hamilton-Jacobi approach and would lead to a rectification of the approach taking into account possible extinctions of sub-populations.

This is a joint work with N. Champagnat, S. Méléard and V. C. Tran.

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