SPEED OF CONVERGENCE TO THE MEAN-FIELD LIMIT FOR A MUTATION-SELECTION PARTICLE SYSTEM

J. CORUJO

Abstract. We study the limit of the empirical distribution induced by a mutation-selection particle system with Moran-type reproduction. This interacting particle system behaves as a continuous-time discrete-state irreducible Markov chain. We show that under some hypothesis on the interaction rates, the mean-field limit at time t is the law of an absorbing Markov chain conditioned to non-absorption up to time t. In this case, this process is a generalisation of the Fleming-Viot particle processes, that has been widely used as approximating algorithms for quasi-stationary distributions. We focus on the control of the speed of convergence when the number of particles, which is constant in time, tends towards infinity. Our results include a uniform-in-time bound for this convergence in $\mathbb{L}^p$ of order $1/\sqrt{N}$, and central limit theorem for the fluctuations of this convergence. We then use the asymptotic expression for the variance of the bias, when the number of particles goes to infinity, to show that in some cases it is possible to minimise the asymptotic quadratic error.