

Two-scale Homogenization of a stationary mean-field game

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In this paper, we characterize the asymptotic behavior of a first-order stationary mean-field game (MFG) with a logarithm coupling, a quadratic Hamiltonian, and a periodically oscillating potential. This study falls into the realm of the homogenization theory, and our main tool is the two-scale convergence. Using this convergence, we rigorously derive the two-scale homogenized and the homogenized MFG problems, which encode the so-called macroscopic or effective behavior of the original oscillating MFG. Moreover, we prove existence and uniqueness of the solution to these limit problems.