

# New numerical methods for time-dependent mean-field games

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Here, we develop numerical methods for mean-field games (MFGs) that satisfy a monotonicity condition. MFGs are determined by a system of partial differential equations with initial and terminal boundary conditions. These non-standard conditions make the numerical approximation of MFGs difficult. Using the monotonicity condition, we build a flow that is a contraction and whose fixed points solve both for stationary and time-dependent MFGs. We illustrate our methods in a finite state MFG that models the paradigm-shift problem, and in various continuous-state MFGs, including a price formation model.