

# FUNCTIONAL ANALYTIC INSIGHTS INTO MEAN FIELD GAME THEORY

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ABSTRACT. Monotonicity conditions are crucial in Mean Field Game (MFG) theory, highlighted by the uniqueness results of Larry and Lions. This talk introduces a functional analytic framework to understand MFGs that satisfy monotonicity conditions. By leveraging ideas introduced in Hessian-Riemannian flows from optimization, we propose regularized versions of MFGs and construct contracting flows that can be used for numerical approximation. Our findings present a consolidated view of our prior works, give a different perspective on this class of problems, and provide a systematic way to build approximation methods for MFGs.

**Keywords:** Mean-field games, monotone flows, numerical methods

**Mathematics Subject Classifications (2010):** 49N70, 91A25, 35Q91, 65M12

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