

## A Lagrange-Galerkin scheme for first order mean field game systems

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In this work, we consider a first order mean field games system with non-local couplings. A Lagrange-Galerkin scheme for the continuity equation, coupled with a semi-Lagrangian scheme for the Hamilton-Jacobi-Bellman equation, is proposed to discretize the mean field games system. The convergence of solutions to the scheme towards a solution to the mean field game system is established in arbitrary space dimensions. The scheme is implemented to approximate two mean field games systems in dimension one and two.

**Théorème 1.** *Under suitable assumptions, we show the convergence, in arbitrary dimension, of our proposed scheme to solution to the first order mean field game system.*

Voir la preuve dans [1].

[1] E. Carlini, F. J. Silva, A. Zorkot. *A lagrange-galerkin scheme for first order mean field game systems*. SIAM Journal on Numerical Analysis, **62(1)**, 167–198, 2024. doi :10.1137/23M1561762.