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Marechaux, 91400 Palaiseau, France, and **Pierre Cardaliaguet**. *Mean field games of first order*.

Mean field game systems were introduced by Lasry and Lions in 2006-7 to describe differential games with large numbers of players. In this presentation we consider a system of mean field games with local coupling in the deterministic limit. Our first main result is the following: under general structure conditions on the Hamiltonian and coupling, we have existence and uniqueness of the weak solution, which is characterized as the minimizer of the optimal control of Hamilton-Jacobi and continuity equations. Our second main result is that the solution converges in the long time average to the solution of the associated ergodic problem. The results have potential applications to differential games as well as transport theory. (Received January 17, 2014)