1030-35-62 **Alberto Bressan*** (bressan@math.psu.edu), Department of Mathematics, Penn State University, State College, PA 16802. *Systems of Hamilton-Jacobi equations and non-cooperative differential games.*

For a non-cooperative differential game, the value functions of the various players satisfy a highly nonlinear system of Hamilton-Jacobi equations. This is usually very hard to study analytically.

As an intermediate step, we consider the case of two players, and assume that the power of the second player in determining the evolution of the state of the system is vanishingly small, say $\epsilon > 0$. This situation arises, for example, in the case of one large producer and several small consumers: If each consumer acts by himself, he has no power to change the state of the system. But if a group of consumers bind together, they will gain some non-trivial bargaining power.

The formal limit $\epsilon = 0$ can be directly solved in terms of two optimal control problems, one after the other. On the other hand, when $\epsilon > 0$, an approximate solution can obtained by a linearization method, solving a linear system of first order PDEs. For a discounted, infinite-horizon problem, we shall discuss the validity of this approximation, toward the construction of a Nash equilibrium solution of the nonlinear problem. (Received July 13, 2007)