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Deterministic particle methods for scalar conservation laws

A scalar conservation law can be formally approximated by a set of interacting particles obeying the so-called ẗfollow-the-leaders̈ystem of ODEs. The rigorous convergence of the corresponding many-particle scheme, proven in collaboration with M. D. Rosini, can be obtained via BV contraction (for BV initial data) for general Lipschitz fluxes or via Oleinik type estimates for genuinely nonlinear fluxes. The scheme requires bounded, summable, nonnegative initial data (possibly with vacuum) and a monotone law for the kinetic velocity. The generalization of this approach to the Cauchy-Dirichlet problem with time-varying boundary conditions will be also presented, as well as the extension to the ARZ model for traffic flow (in presence of vacuum) and the Hughes model for pedestrian movements (work in collaboration with Fagioli, Rosini, and Russo).