Karlstad Applied Analysis Seminar

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Unique solvability of discontinuous ODEs for particle dynamics subject to impenetrable boundaries

Abstract

We consider the dynamics of particle systems where the particles are confined in a bounded domain by an impenetrable boundary condition. When particles hit the boundary, we consider an instantaneous change in velocity, which turns the systems describing the particle dynamics into an ordinary differential equation with discontinuous right-hand side. We establish the existence and uniqueness of a mild solution. We also apply our theory to the gradient flows of interacting particle energies and make numerical simulations of particles motion on various choice of domains.