On variational kinetic Formulations for scalar conservation laws and the equations of gas dynamics

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The kinetic formulation of weak entropy solutions of scalar conservation laws, developed by Lions-Perthame-Tadmor(1994), can be equivalently expressed in a variational form. This property was discovered by Panov(1996) in his theory of kinetic measure-valued solutions and, independently, in a recent paper of Brenier(2009). We discuss a number of interesting properties of such variational kinetic solutions, in particular, the geometric interpretation of solutions as curves in a suitable Hilbert space for which the tangent vector minimizes an interaction functional. In the second part of the talk we will describe a variational kinetic formulation for the Euler equations of gas dynamics that has the geometric structure similar to the structure of the kinetic form of scalar conservation laws.