

Regularity in kinetic formulations via averaging lemmas

Pierre-Emmanuel Jabin

*Département de Mathématiques et Applications, Ecole Normale Supérieure
e-mail: jabin@dma.ens.fr*

This talk represents joint works with Benoit Perthame, DMA, ENS and Luis Vega, University of Bilbao, Spain.

A new class of averaging lemmas is developed, they are directly motivated by the question of regularity for different nonlinear equations or variational problems which admit a kinetic formulation. In particular they improve the known regularity for systems like $\gamma = 3$ in isentropic gas dynamics or in some variational problems arising in thin micromagnetic films. They also allow to obtain directly the best known regularizing effect in multidimensional scalar conservation laws.

The new ingredient here is to use velocity regularity for the solution to the transport equation under consideration. The proof is based on a decomposition of the density and the K -method of real interpolation but it can be done completely in the real space without any use of Fourier transform.