

Transport equation - from renormalizations to regular Lagrangian flows.

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Abstract

My talk will concentrate on various methods for transport equation with non-regular transport coefficient. A starting point will be the concept of renormalized solutions to transport equation introduced by R. DiPerna and P.-L. Lions. In the classical setting the connection to corresponding ordinary differential equation is straightforward. However extensions to less regular vector fields are of significant interest and motivations for such studies arise from many equations of mathematical physics. I will show an example of a transport equation with an integral term and discuss the problems of existence, uniqueness and stability. For this problem, which comes from description of polymeric flows, we will see that the approach of DiPerna and Lions is not efficient and I will explain how the approach of regular Lagrangian flows can be used in this case. The last part of the talk is a common result with Camillo De Lellis and Piotr Gwiazda.