



Universität
Basel

Research Project

Continuity equations with non smooth velocity: fluid dynamics and further applications

Third-party funded project

Project title Continuity equations with non smooth velocity: fluid dynamics and further applications

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Organisation / Research unit

Departement Mathematik und Informatik / Analysis (Crippa)

Department

Project start 01.04.2012

Probable end 30.09.2014

Status Completed

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We will address various open problems related to the behaviour of the continuity equation and of the associated ordinary differential equation when the vector field governing the transport process lacks the usual (Lipschitz) regularity properties. The motivations come from the applications of such results to nonlinear problems, originating in fluid dynamics or in the theory of conservation laws. Besides exploiting hyperbolic PDEs techniques, the analysis requires new tools from geometric measure theory, properly adapted in order to describe and control the irregular behaviours under consideration. One first line of work regards a precise understanding of further suitable weak settings in which the continuity equation and the ordinary differential equation are well-posed and enjoy additional properties (compactness or regularity of solutions, for instance). A second line will address some questions on two-dimensional incompressible nonviscous fluids, mainly in the framework of measure-valued vorticity. We will address various open problems related to the behaviour of the continuity equation and of the associated ordinary differential equation when the vector field governing the transport process lacks the usual (Lipschitz) regularity properties. The motivations come from the applications of such results to nonlinear problems, originating in fluid dynamics or in the theory of conservation laws.ă

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Financed by

Swiss National Science Foundation (SNSF)

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