Euler system and Onsager's conjecture

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The Euler system has been derived more than 250 years ago to describe the flow of inviscid incompressible fluid. An absolutely fundamental question is always well-posedness of a system, with an issue of existence of solutions on the first place. Although it has been studied by thousands of scientists, the only available results of well-posedness up till recently were:

- existence of classical solutions for a finite time interval,
- global existence of solutions in class of measure-valued solutions, which is a very weak type of solutions.

The beginning of this century appeared to be an incredible breakthrough in the theory. An open problem of existence of global weak solutions to Euler system was solved in 2011! Unfortunately this was not equivalent with confirming that the system is well-posed, because the solutions appeared to be incredibly non-unique. Then the last ten years have brought a magnitude of important results in this topic. I will concentrate on explaining the details of hypothesis of Lars Onsager, who in 1949 postulated the critical regularity of solutions to Euler system which provides that the kinetic energy is conserved, and below that threshold there might be solutions which do not conserve energy.