On the blow-up problem for the incompressible Euler equations

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Abstract

In this talk we discuss the problem of finite time blow-up for the 3D incompressible Euler equations. After brief introduction we first review previous approaches to removing self-similar/discretely self-similar blow-up scenarios, which corresponds to the proof of Liouville type theorems for the self-similar Euler equations. Next we discuss the self-similar blow-up in energy conserving scale with L^2 profile. The case of L^2 profile for the self-similar solution is particularly interesting, since it corresponds to the energy concentration at the blow-up time. Removing the self-similar blow-up in the L^2 profile was proved successfully by recent joint work with J. Wolf. In fact in this work we proved more general result that there exists no one point energy concentration under the Type I condition. This together with the blow-up argument we can also prove that there exists no atomic concentration of energy. We also discuss the local type I blow-up criteria, which is also a joint work with J. Wolf.