Einladung zum

Würzburger Mathematischen Kolloquium

Julius-Maximilians-Universität Würzburg • Fakultät für Mathematik und Informatik

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Turbulence for Navier-Stokes equations in the zero viscosity limit with boundary effects

Mittwoch, 14. Okt. 2015 • 16:15 Uhr
Raum SE 40, Mathematik Ost, Emil-Fischer-Str. 40, Campus Hubland-Nord

Inhaltsangabe

This is a lecture about solutions of the Navier-Stokes equations and its inviscid limit, the Euler equations, made famous by the million dollar Clay problem. The open question on regularity of the solution posed there will be better understood if one gains a deeper understanding of turbulence.

There is a strong analogy between the notion of statistical turbulence and the notion of weak convergence for deterministic regimes. Both are based on some kind of averaging. In particular the appearance of turbulence is related to anomalous energy dissipation while weak convergence also differs from strong convergence by energy dissipation, i.e. the lower semi continuity of the L2 norm. Notably it turns out that this effect is the most explicit in the presence of physical boundary. This is in full agreement with the following fact: In most of the physical experiments the turbulence is generated by some boundary effect.

Therefore I assume the existence of a smooth solution u(x, t) , $x \in \Omega$, $t \in [0, T]$, of the Euler equations subject to no-normal flow at the boundary and of smooth solutions of the Navier-Stokes equations with the same initial data. I will consider both system with the same initial data and on a finite fixed time interval [0,T] .

Since the energy is the only uniform estimate available, I use it to revisit a basic criteria of Kato. To the best of my knowledge this is the only deterministic scenario where one can relate anomalous dissipation of energy with appearance of turbulence.

This talk is work made in collaboration with F. Golse, L. Paillard, T. Nguyen, L. Szekelyhidi, E. Titi and E. Wiedemann.

Zu diesem Vortrag laden wir Sie herzlich ein.
Im Anschluss an die Vorträge stehen Kaffee und Tee im Foyer vor dem SE 40 bereit.

Die Dozentinnen und Dozenten der Mathematik