Universität Konstanz

Fachbereich Mathematik und Statistik

Prof. Dr. R. Denk, Prof. Dr. R. Racke, Prof. Dr. O. Schnürer

Wir laden recht herzlich zu einem Vortrag im Rahmen des

Oberseminars Partielle Differentialgleichungen

ein:

Dr. Martin Saal

(TU Darmstadt)

"White noise solutions for (m)SQG"

Donnerstag, 29. November 2018

Beginn: **15:15 Uhr**
Raum: **F0426**

Interessenten sind herzlich willkommen!

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Zusammenfassung: The surface quasigeostrophic equation (SQG) describes (roughly speaking) the temperature θ in a rapidly rotating stratified fluid with velocity field u in a two-dimensional setting and reads

$$\partial_t\theta + u\cdot\nabla\theta = 0,$$
$$u = \nabla^{\perp}|\Delta|^{-1/2}\theta,$$

where $\nabla^{\perp} = (-\partial_y, \partial_x)$. It has applications in both meteorological and oceanic flows, while in mathematics it is often used as a toy model for the 3D Euler equations due to some structural similarities of these equations. We consider a modified version (mSQG) with a smoother velocity field in the Torus $\mathbb{T}^2$. It reads

$$\partial_t\theta + u\cdot\nabla\theta = 0,$$
$$u = \nabla^{\perp}|\Delta|^{-1/2-\varepsilon}\theta,$$

where $\epsilon \in (0, 1/2)$. For $\varepsilon = 1/2$ we obtain the vorticity formulation of the 2D Euler equations, for $\varepsilon = 0$ the SQG. We will show that we can make sense of the nonlinearity even in the case of white noise solutions, which have trajectories in $C([0,T], H^{-1-\delta}(\mathbb{T}^2))$ for arbitrary $\delta > 0$. We also introduce random point vortices and sketch the construction of a white noise solution to mSQG. Finally, we give some comments on the case $\varepsilon = 0$.

(eingeladen von Prof. Dr. Reinhard Racke)