Oberseminar Nichtlineare Differentialgleichungen

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Higher-order corrections to the Euler approximation of the 2D semi-geostrophic equation

24. Oktober 2025 - 10:15 – Raum 8.526

Abstract: The (dual) semi-geostrophic equations are a nonlinear coupled transport/Monge-Ampere system modeling large-scale atmospheric dynamics. G. Loeper showed in 2006 that in an appropriate scaling they can be seen as a fully nonlinear perturbation to the 2D Euler vorticity equations, a nonlinear coupled transport/Poisson system. The error between original and approximate solutions is shown to be of order $O(\ )$.

In this talk we present a generalization of this leading order approximation to higher-order correction terms that are obtained by an hierarchy of linear inhomogeneous coupled transport/Poisson systems and show that the error between a solution of the original system and the expansion provided by the approximate equations is of the order $O(\ ^n)$. This is joint work with V. Kalivopoulos, supported by the Hellenic Foundation for Research and Innovation (HFRI).

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