Karlsruhe Institute of Technology

Seminar of the Work Group
Nonlinear Partial Differential Equations
SS 26

July 1st, 2026, 11:30 - 13:00
Seminar room: SR 3.069

On the Energy Constrained Optimal Mixing Problem

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Abstract

The optimal mixing problem addresses the question of how fast a passive scalar can be mixed under the influence of an incompressible velocity field. The talk focuses on the case where the energy of the allowed fields, i.e. their L^2 norm, is uniformly bounded in time. In that setting perfect mixing in finite time is permitted and indeed realized in some examples by Depauw 2003 and Lunasin, Lin, Novikov, Mazzucato, Doering 2012. On the other hand a lower bound on the time in which perfect mixing can be achieved is known due to Lin, Thiffeault, Doering 2011. In the talk we will show an improvement of the lower bound for the special case of initial data depending only on one spatial coordinate. We will also discuss an example for which the new lower bound is sharp. The proofs rely on differential inclusions, variational methods and ideas of steepest descent.