Karlsruhe Institute of Technology

Seminar of the Work Group
Nonlinear Partial Differential Equations
WS 25/26

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Seminar room: SR 3.069

On the Asymptotic Stability Problem for Soliton Solutions to the Boussinesq-type Models

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Abstract

In this talk, we introduce the Boussinesq family of equations, revisit some known results, and present new findings on the asymptotic stability of solitary wave solutions in the energy space. In particular, we consider the one-dimensional Kaup–Broer–Kuperschmidt (KBK) model with initial data in the energy space $H^1 \times L^2$. This model belongs to the broader family of `abcd` Boussinesq models introduced by Bona, Chen, and Saut, to describe shallow water waves under the influence of dispersion and large amplitudes. The KBK model admits solitary waves with speeds $c \in (-1, 1)$. Angulo established their orbital stability in $L^2 \times H^1$, assuming local well-posedness in $H^1 \times H^2$. Building on this, we prove that KBK solitary waves are asymptotically stable for initial data in the energy space and for a range of speeds, relying on a new set of virial estimates specifically adapted to the KBK system in a moving frame. This talk is based on a series of joint works with Claudio Muñoz.