EBERHARD KARLS
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Mathematisch-
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Fachbereich Mathematik

AB Geometrische Analysis und
Mathematische Relativitätstheorie

Wintersemester 2019/20

Oberseminar
Geometrische Analysis und Mathematische Relativitätstheorie

Am Donnerstag, den **21.11.2019** spricht um **14 Uhr c. t.** im Raum C9A03

Prof. Dr. Wolf-Patrick Düll
(Universität Stuttgart)

über das Thema

Justification of the Korteweg-de Vries and the Nonlinear Schrödinger approximation for the two-dimensional water wave equations

We consider the evolution system for two-dimensional surface water waves in an infinitely long canal of finite depth. Since the full system is too complicated for a direct analysis of the qualitative behavior of its solutions, it is important to approximate the system in different parameter regimes by suitable reduced model equations whose solutions have similar but more easily accessible qualitative properties. The most famous nonlinear reduced models are the Korteweg-de Vries (KdV) equation for the approximate description of the dynamics of soliton-like solutions and the Nonlinear Schrödinger (NLS) equation for the approximate description of the dynamics of wave packet-like solutions. To understand to which extent these approximations yield correct predictions of the qualitative behavior of the original system it is important to justify the validity of these approximations by estimates of the approximation errors in the physically relevant length and time scales. In this talk, we give an overview on the KdV and the NLS approximation and their justifications. Special emphasis will be put on the most challenging case, namely, the proof of error estimates for the NLS approximation being valid for surface water waves with and without surface tension. These estimates are obtained by parametrizing the two-dimensional surface waves by arc length, which enables us to derive error bounds that are uniform with respect to the strength of the surface tension, as the height of the wave packet and the surface tension go to zero.

Hierzu wird herzlich eingeladen.

C. Cederbaum, G. Huisken