



Einladung zur öffentlichen Defensio von

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Thema der Dissertation:

On singular wave equations

Abstract:

This work is concerned with the existence theory of wave equations on Lorentzian manifolds of low regularity using the theory of generalized functions. We build upon a result by Grant, Mayerhofer and Steinbauer who proved an existence and uniqueness theorem for scalar linear wave equations with coefficients of low regularity (in the sense of Colombeau). From a geometrical viewpoint this proves the well-posedness of the Cauchy problem for the Laplace-Beltrami operator of a generalized Lorentzian manifold. In the context of Clarke's proposal of generalized hyperbolicity such spacetimes are called G-hyperbolic and can be considered as non-singular. In this work we extend the existence and uniqueness theory of Grant, Mayerhofer and Steinbauer to linear tensorial wave equations including lower order terms with regard to a possible application on the existence theory of quasilinear equations. The technical centrepiece are higher order energy estimates which we present in a particular clear way to derive an existence and uniqueness theorem in the generalized setting. We also discuss the relations of low regularity wave equations and symmetric hyperbolic first order systems based on the work of Hrmann and Spreitzer which amounts in further existence and uniqueness results for both wave equations and first order systems.

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