


Key words: degenerate semilinear parabolic equations, regional null controllability, persistent regional null controllability.

In this talk we present controllability properties of semilinear weakly degenerate parabolic equations in a bounded domain of $(−\infty, +\infty)$. Due to degeneracy, classical null controllability results do not hold in general. Thus we investigate results of 'regional null controllability', showing that we can drive the solution to rest at time $T$ on a subset of the space domain, contained in the set where the equation is nondegenerate.

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QUANTITATIVE MICROWAVE TOMOGRAPHY WITH A QUASI-NEWTON ALGORITHM

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Key words: inverse scattering, Quasi-Newton, permittivity

In this paper the performance of a Quasi-Newton optimization technique, implemented in a two-dimensional (2D) microwave imaging algorithm is examined. The aim of the algorithm, which can be applied in biomedical imaging and nondestructive testing, is to reconstruct the unknown 2D complex permittivity distribution of a (lossy) dielectric object, that is excited with given harmonic incident waves, from a set of measured scattered field data. An exact constraint-source integral equation formulation for the electric field, based on the Maxwell equations, is adopted. It follows that the complex permittivity depends on the field in a nonlinear manner. For the solution of this nonlinear and ill-posed inverse problem, an iterative BFGS quasi-Newton optimization scheme with approximate line searches [1] is applied to a nonlinear least squares cost function, representing the error between the measured field data and the field computed for a parameterized complex permittivity distribution, possibly augmented with a regularization term. The technique is illustrated with complex permittivity reconstructions of inhomogeneous lossy dielectric objects.


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CONDITIONS SUFFICIENT FOR THE REGULARITY OF MINIMIZERS IN PROBLEMS MOTIVATED BY NONLINEAR ELASTICITY

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Calculus of Variations, Nonlinear Elasticity, Regularity:
Given a body of elastic material, a basic problem in elastostatics is to find a deformation of this body that displaces the body's surface in some prescribed manner and minimizes a given energy functional. To preclude, as possible minimizers, those deformations that reverse the orientation of the material in a part of the body or compress a part to a region with zero volume, it is physically reasonable that the functional be equal to infinity for these types of deformations. In this talk, I will present conditions on a minimizer of physically reasonable energy functionals that are sufficient for ensuring its partial regularity; i.e. has a Hölder continuous gradient outside a relatively closed set with measure zero. I will also discuss the local regularity of bi-Lipschitz minimizers.

CONTROLLABILITY OF SEMILINEAR WEAKLY DEGENERATE PARABOLIC EQUATIONS IN BOUNDED DOMAINS

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ABSTRACTS

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