

Berlin Leipzig Seminar

Analysis/probability theory

Second Meeting Summer Term 2010

Organized by the DFG Research Group *Analysis and Stochastics in Complex Physical Systems*

DATE: Friday, 9 July 2010

VENUE: Technical University Berlin, Institute for Mathematics, Str. des 17. Juni 136, 10623 Berlin, Room MA313

PROGRAMME:

9:40–10:30: **Michel Ledoux (University of Toulouse)**

The geometry of convolution inequalities

Abstract: The Brascamp-Lieb inequalities for multiple integrals describe versions of the Hölder inequality in directions of the Euclidean space. Established first by symmetrisation, optimisation of Gaussian kernels or optimal transportation, recent developments by E. Carlen, E. Lieb, M. Loss and J. Bennett, A. Carbery, M. Christ, T. Tao put forward a new approach by evolution along the heat equation. In particular, this proof relies on suitable geometric decompositions of the identity, which give direct access to some famous convolution inequalities in Harmonic Analysis with their best constants.

10:40–11:30: **Dorothee Knees (Weierstrass Institute Berlin)**

On the vanishing viscosity method in fracture mechanics

Abstract: The Griffith criterion is an energetic fracture criterion which is frequently applied to decide whether a preexisting crack in an elastic body is stationary for given external forces. Moreover, a great number of models rely on the Griffith criterion and describe the time evolution of a crack. In this lecture we model the evolution of a single crack as a rate-independent process based on the Griffith criterion and discuss different possibilities for setting up such models. In the last years mainly two approaches were followed: Models based on global energy minimization (elastic energy + dissipation) and models based on a local description of force balance type.

Our focus lies on the analysis of local models which appear as the limit of evolution models with a viscous regularization. Moreover, we discuss the convergence of fully discretized models (i.e. with respect to time and space) to the local model. The convergence proof relies on new regularity estimates for the elastic fields close to the crack tip taking into account non-penetration conditions on the crack faces. Finally an outlook to phase-field like damage models will be given. The advantage of these models is that no a-priori knowledge on the crack path is needed. The research is joint work with A. Mielke, R. Rossi, A. Schröder and C. Zanini.

11:40–12:30: **Erwin Bolthausen (TU Berlin, on leave from University of Zurich)**

On the ultrametricity problem in spin glass theory

Abstract: Ultrametricity is a very puzzling open problem in spin glass theory. We describe the problem, discuss why it is thought to be important, and present attempts to shed some light on it.

Everybody is welcome to attend.

Wolfgang König, TU Berlin and WIAS Berlin