EMS Lectures 2002

Lecturer:	**Professor Gianni Dal Maso**
Titel of lectures:	**Neumann problems in domains with cracks and applications to fracture mechanics**
Location 1:	Leipzig, April 22-26, 2002
Location 2:	Paris, May 13-17, 2002

Abstract:

The first part of the course is devoted to the study of solutions to nonlinear elliptic equations in $\Omega \setminus K$, where Ω is a two-dimensional smooth domain and K is a compact one-dimensional subset of Ω. The solutions are required to satisfy a homogeneous Neumann boundary condition on K and a non-homogeneous Dirichlet condition on $\partial\Omega$. The main result is the continuous dependence of the solution on K, with respect to the Hausdorff metric, provided that the number of connected components of K remains bounded. Classical examples show that the result is no longer true without this hypothesis.

Using this stability result, the second part of the course develops a rigorous mathematical formulation of a variational quasi-static model of the slow growth of brittle fractures, introduced by Francfort and Marigo. Starting from a discrete-time formulation, a more satisfactory continuous-time formulation is obtained, with full justification of the convergence arguments.