ZURICH GRADUATE COLLOQUIUM

Tuesdays, 5:15 pm
Hermann Weyl Zimmer, ETH Zentrum
in alternation with the
Zurich Colloquium in Mathematics

Speaker: **Anna Schneebeli (Basel)**

Title: **Discontinuous Approximation of Electromagnetic Fields**

Date: Tuesday, June 7th

The finite element method (FEM) is a well studied and popular mathematical tool to approximately solve partial differential equations (PDEs). Years of research have provided FEMs for a zoo of problems from fields such as stuctural mechanics, fluid and gas dynamics, elasticity theory or electromagnetics. Nowadays, a wide variety of commercial FEM software is commonly employed in applications of engineering practice. Nonetheless, unsatisfactory performance of existing FEMs for specific problems or interest in unexploited PDEs still motivate the development of novel FEMs.

In this talk we will briefly revise the basics of the standard FEM. For this purpose, we shall consider the case where the analytic solution to a suitable PDE is approximated by piecewise linear, continuous functions. We will show however, that this standard FEM cannot always ensure a satisfactory approximation to the solution of Maxwell's equations of electromagetism. There are cases, where the piecewise linear, continuous functions are too smooth to capture all physical features of the electromagnetic field. As a possible remedy, we will present a so-called *discontinuous Galerkin* (DG) FEM, where the electric or magnetic field components in Maxwell's equations are approximated by completely discontinuous piecewise polynomials.

The work on DG FEMs for (second-order) Maxwell's equations is a collaboration with M. Grote (Basel), P. Houston (Leicester), I. Perugia (Pavia) and D. Schötzau (UBC, Vancouver).

http://www.math.ethz.ch/graduate/colloquium

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