Università degli Studi di Padova

MINICORSI DI ANALISI MATEMATICA

Nel mese di Dicembre 1998 nel Dipartimento di Matematica Pura ed Applicata e nel Dipartimento di Metodi e Modelli Matematici per le Scienze Applicate si terranno i seguenti minicorsi:

Topics in Quasiconformal Mappings and Teichmüller Space Theory

tenuto dal Prof. **Samuel Krushkal** dell'Università di Bar-Ilan, Israele nei giorni

Mercoledì 9 Dicembre, dalle ore 16.30 alle ore 18.00;
Giovedì 10 Dicembre, dalle ore 16.30 alle ore 18.00;
Venerdì 11 Dicembre, dalle ore 16.30 alle ore 18.00

presso l'aula P100 dell'Edificio Paolotti, sito in Via Belzoni 7.

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Regularity of minimizers for the Mumford-Shah functional

tenuto dal Prof. **Guy David** dell'Università di Paris-Sud, Francia nei giorni

Lunedì 14 Dicembre, dalle ore 16.30 alle ore 18.00;
Martedì 15 Dicembre, dalle ore 16.30 alle ore 18.00;
Mercoledì 16 Dicembre, dalle ore 11.00 alle ore 12.30

presso l'Auletta del Dip.to di Metodi e Modelli Matematici per le Scienze Applicate, sito in Via Belzoni 7.

PROGRAMMA DEI MINICORSI

Topics in Quasiconformal Mappings and Teichmüller Space Theory

- Background: Quasiconformal maps on the plane and Riemann surfaces.
- Uniformization of Riemann surfaces.
- Elements of the discrete groups theory.
- Problems of Groetzch and Teichmüller.
- Teichmüller' theory of extremal quasiconformal maps and its extensions.
- The deformation spaces of Riemann surfaces (Teichmüller, Fricke, Schottky).
- Real analytic theory of Teichmüller spaces.
- Teichmüller's modular group and the mapping class group.
- Complex holomorphic theory of Teichmüller spaces. Bers' embedding. Fiber spaces and Bers' isomorphism theorem.
- Infinitesimal description and deformations.
- The Weil-Petersson metric, Fenchel-Nielsen coordinates and symplectic structure.
- Holomorphic motions and Teichmüller spaces.
- Other applications.

Regularity of minimizers for the Mumford-Shah functional

The Mumford-Shah functional has been used extensively for image segmentation. Given an initial image (*i.e.,* a bounded function g defined in a simple planar domain), one tries to approximate g by a "simpler" function u. The constraints are that u should be as close as possible to g, have a derivative in L^2 (with a norm as small as possible), except on a singularity set K with finite length (as small as possible) where it may have jumps.

The arbitration is made by minimizing the sum of three terms, one for each of the three constraints above (the Mumford-Shah functional).

After a short introduction on the relationships with image segmentation, we shall concentrate on the regularity properties of the singularity set K associated to minimizers of the Mumford-Shah functional. We should be able to derive lots of those, mostly with constructions by hand. Hopefully we shall be able to get to the blow-up arguments of A. Bonnet, very close to the status of current research.

Our main techniques will be elementary constructions of geometric measure theory.

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