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ABSTRACTS

Nonlinear analysis and mean curvature in Minkowski space

Cristian Bereanu

In this talk we study the Dirichlet problem for some nonlinear perturbations of the mean curvature operator in Minkowski space. Existence and multiplicity results are obtained via degree theory and variational methods.

Bloch-Iserles Hamiltonian System

Vasile Brînzănescu

In a paper in 2009, Bloch, Brînzănescu, Iserles, Marsden and Raţiu studied the Hamiltonian system introduced by Bloch and Iserles in 2006 and showed that this system is completely integrable. In 2015, Brînzănescu and Raţiu proved that this Hamiltonian system is algebraically complete integrable. We shall present the ideas of the proofs.

On a generalized Arzela theorem and applications

Gheorghe Bucur

We consider a duality between two non-empty sets X and Y with values in $\mathbb{R}$ (or in a general metric space) and we endow X and Y with the topology of uniform convergence given by this duality. We show that X and Y are simultaneously compact.

Contractive sequences in metric spaces; applications

Ileana Bucur

In the metric spaces we consider a special type of sequences related with a contraction function on $\mathbb{R}$. A convergence theorem for such sequences has some interesting applications in the fixed point theory and in excursions in the space controled by a contraction function.

Semimartingale functionals of Markov processes: a semigroup approach

Iulian Cîmpean

We discuss extensions of Fukushima's characterization for semimartingale functionals of symmetric Markov processes, to the case of semi-Dirichlet forms. Our approach is new and it is based on a semigroup characterization for quasimartingale functionals of general Markov processes.

Potential theory and ergotic theorems

Radu Gologan

The talk is devoted to some of my results concerning generalisations of ergodic theorms to the case of ordered structures, as for example sigma-latice cones.

Measure-valued processes, a stochastic model for avalanches

Oana Lupaşcu

Based on joint works with **Lucian Beznea**.

We construct fragmentation and branching processes, leading to a a stochastic model for the fragmentation phase of an avalanche. A fractal property of the process is emphasized. We establish a specific stochastic differential equation of fragmentation. The results are obtained by combining analytic and probabilistic potential theoretical tools.

On the asymptotic behavior of some classes of nonlinear eigenvalue problems involving the p-Laplacian

Mihai Mihăilescu

Based on a joint work with **Marian Bocea**.

The goal of this talk is to present recent results concerning two different PDEs which can be regarded as the limiting equations of some families of nonlinear eigenvalue problems. First, eigenvalue problems involving the p-Laplacian and rapidly growing operators in divergence form are studied in an Orlicz-Sobolev setting. An asymptotic analysis of these problems leads to a full characterization of the spectrum of an exponential type perturbation of the Laplace operator. Next, the issue of existence of nonnegative solutions for a class of problems depending on a real parameter and involving the ∞-Laplacian is considered. It is shown that nontrivial nonnegative viscosity solutions for this class of problems exist if and only if the parameter is greater than or equal to the reciprocal of the maximum of the distance to the boundary of the domain.

On some properties of measure-theoretic entropies and hypoentropies

Corina Mitroi Symeonidis

The aim of this presentation is to describe the mathematical behavior of the entropy and hypoentropy formulated within a measure-theoretic framework. Relations between mass transport plans and the measure-theoretic entropy of dynamical systems are established.

Pólya's urn model and probabilistic approximation: an improved Bernstein-type operator

Mihai N. Pascu

In this talk, we use Pólya's urn model with (negative) replacement in order to introduce a new Bernstein-type operator and we study its properties.

We show that the new operator gives a better approximation than the classical Bernstein operator, and we provide numerical evidence showing that it is also an improvement of some other classical Bernstein-type operators. We also obtain some probabilistic results which may be of independent interest.

Homogenization of fluid flows through fractured porous media

Dan Polisevski

We consider the flow of an incompressible viscous fluid through a porous material, fractured by a connected network of periodically distributed fissures.

The flow is governed by the Darcy law in the porous material and by the Stokes equations in the fissures. The interfacial transfer obeys to the Saffman version of the Beavers-Joseph condition.

We study the asymptotic behavior of the flow as the period of the network goes to zero. We find the system which defines the limits of the Stokes velocity and of the Darcy velocity and pressure. The incompressibility at the microscopic level implies a macroscopic condition which involves both limits of Stokes and Darcy velocities, neither of them having zero divergence.

Summary

A concept of harmonicity for families of curves and surfaces

Eleutherius Symeonidis

The mean value of a harmonic function of two variables over concentric circles is the same for all such circles. The same holds, more generally, in the case of confocal ellipses, the mean value being computed in a certain natural way. In higher dimensions analogous statements hold, where the circles and ellipses are replaced by spheres and ellipsoids, respectively. These facts are due to general principles, which can serve to characterize families of curves or surfaces with such invariance properties. In this talk we uncover these principles and demonstrate their applications.