

Symposium on Partial Differential Equations

22-23 March 2010

Department Of Mathematics, College of Arts & Sciences

The Petroleum Institute, Umm Shaif Bldg (Room 4-020) Abu Dhabi

Monday March 22nd, 2010

11.00 AM	Welcome
11:10-11:50 AM	Dr. Jiri Neustupa Mathematical Institute of the Czech Academy of Science, Czech Republic
Title	On steady solutions of the homogeneous Euler equation - a conjecture.
Abstract: Minimizers of certain functional are steady solutions of the homogeneous Euler equation. I consider a special class of solutions satisfying the homogeneous Dirichlet boundary condition. A conjecture regarding the pressure and regarding the structure of solutions in the mentioned special class will be discussed. Arguments supporting the conjecture will be presented.	

12:30 - 1:10 PM	Dr. Rolando Magnanini Dipartimento di Matematica "U. Dini", University of Florence, Italy
Title	Short-time asymptotics in nonlinear diffusion and symmetry of the domain
Abstract: I will show how a result describing the asymptotic behaviour for short times of solutions of certain initial-boundary value problems for the heat equation, due to Freidlin, Ventcell and Varadhan, can be extended to the case of fast-diffusion nonlinear equations. As a consequence, I will prove that, if the relevant domain contains an invariant (in time) level surface of the solution, then it must be a ball.	
1:20 - 2:00 PM	Dr. Paolo Salani Dipartimento di Matematica "U. Dini", University of Florence, Italy
Title	Convexity in Bernoulli Problems
Abstract: Free-boundary problems of Bernoulli type arise in various physical situations like fluid dynamics, electrochemical machining, optimal insulation and many more. There are two different kinds of problems, the exterior and the interior one, both concerning nested domains that, in the classical situation, represent an annular condenser with a prescribed boundary component while the other one, the free boundary, is determined (together with a potential function) so that the intensity of the electrostatic field is constant on it. I will present some concavity properties connected to nonlinear Bernoulli problems, leading also to an isoperimetric type inequality for the Bernoulli Constant of a convex domain.	
2:10 - 3:50 PM	Dr. Jyotshana V. Prajapat The Petroleum Institute, Abu Dhabi
Title	Two phase free boundary problems
Abstract: I prove existence of solution for a functional related to two phase free boundary problem and discuss specific examples.	

Tuesday March 23, 2010

11:10 -11:50 AM	Dr. Friedemann Brock American University, Beirut
Title	Asymptotics at infinity of solutions for p-Laplace equations in exterior domains
<p>Abstract: Let $1 < p < N$, and u a nonnegative solution of $-\Delta_p u = f(x, u)$ on $\mathbb{R}^N \setminus B_1$ where f behaves like $x ^{-l} u^q$ near $x = 1$ and $u = 0$, for some constants $q \geq 0$ and l in \mathbb{R}. We obtain asymptotic decay estimates for u. In particular, our results are complete in the 'sub linear case' $q < p - 1$. A related analysis is carried out for systems of the type $-\Delta u = f(x, v)$, $-\Delta v = g(x, u)$. In this way we extend and improve some known results of Bidaut-Veron, Mitidieri, Pohozaev, and other authors. Our proofs use tools such as Harnack inequality, Maximum Principle, Liouville Theorems and blow-up arguments. This is a joint work with A. Avila (Temuco). We also discuss some applications to symmetry results in the Laplacian case $p = 2$.</p>	
2:10 - 3:50 PM	Dr. Fahir Akyildiz The Petroleum Institute, Abu Dhabi
Title	Spectral Approximation for Drainage of an Elastico-Viscous liquid and Error Analysis
<p>Abstract: A Fourier-Galerkin spectral method is proposed and used to analyze a system of quasilinear partial differential equations governing the drainage of liquids of the Oldroyd four-constant type. It is shown that Fourier-Galerkin approximations are convergent with spectral accuracy. An efficient and accurate algorithm based on the Fourier-Galerkin approximations to the system of quasilinear partial differential equations are developed and implemented. Numerical results indicating the high accuracy and effectiveness of this algorithm are presented.</p>	