ICMC SUMMER MEETING

on Differential Equations

2018 Chapter

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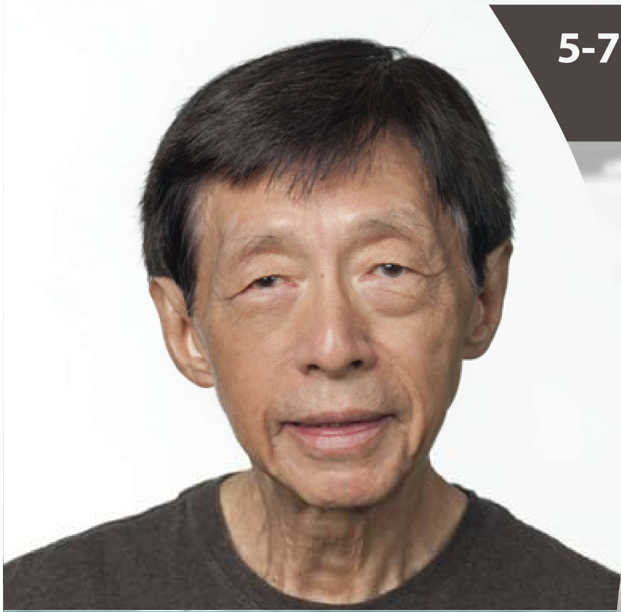

Celebrating the 75th birthday of Shui-Nee Chow

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List of sessions

Computational dynamics

Conservation laws and transport equations

Dispersive equations

Elliptic equations

Fluid dynamics

Linear equations

Nonlinear dynamical systems

Ordinary and functional differential equations

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where ϵ is a positive parameter, $N \geq 2$, V, f are continuous functions satisfying some technical conditions and ϕ is a C^1-function.

"Drift-Diffusion" model

Eduardo Lima de Oliveira, Hector Vargas, Jiang Zhu, Abimael Fernando Loula
Instituto Federal de São Paulo

In this work, we investigated the numerical aspects in the treatment of a nonlinear system of partial differential equations, in which the nonlinearities are related to the couplings of the coefficients that depend on the temperature variation. In general, this model is obtained through the principle of electric charge conservation, known as Gaussian law, and the thermal energy variation, established by the heat equation. These equations are coupled to a subsystem that describes the charges transport inside a semiconductor material. The system formed by these four differential equations constitutes the "drift-diffusion" model with thermal effect. This is the object of our analysis.

Regularity theory for a semilinear free boundary problem under Dini-continuity conditions

Giane Casari Rampasso, Anne Caroline Bronzi, Edgard Almeida Pimentel
UNICAMP

In this poster we consider a semilinear equation of the form

$$Lu(x) = f(x, u) \quad \text{in} \quad B_1, \tag{8}$$

both in the variational and the nonvariational senses. We produce estimates in $\mathcal{C}^{1,1^-}_{loc}(B_1)$ for the solutions to (8) under fairly general assumptions on the data of the problem. For example, those include a Dini-continuity condition on the source term, together with the existence of a Newtonian potential of class $\mathcal{C}^{1,1}$. We argue through approximation techniques and methods in the so-called geometric tangential analysis. In fact, we relate our problems of interest to an auxiliary one, driven by the Laplacian operator. In this case, a richer regularity theory is available and we import information along a suitable geometric structure. This is joint-work with A. Bronzi (Unicamp) and E. Pimentel (PUC-Rio).

Homogenization of the p-laplacian in thin domains: The unfolding approach

Jean Carlos Nakasato, Marcone Corrêa Pereira
Universidade de São Paulo

In this work we apply the unfolding operator method to thin domains of type $R^\varepsilon = \{(x, y) \in \mathbb{R}^2 : 0 < x < 1, 0 < y < \varepsilon g(x/\varepsilon^\alpha)\}$, where $\alpha > 0$ and $g : \mathbb{R} \to \mathbb{R}$ is a L-periodic function not necessarily smooth satisfying $0 \leq g_0 \leq g(\cdot) \leq g_1$ for some fixed non-negative constants g_0 and g_1. This approach was presented by Arrieta and Pesqueira to study the linear Neumann problem $-\Delta u + u = f$ posed in two-dimensional thin domains with an oscillatory boundary. We generalize this problem to the nonlinear p-laplacian problem $-\Delta_p u + |u|^{p-2}u = f$ with homogeneous Neumann boundary condition, $p > 1$. As Arrieta and Pesqueira, we assume very mild hypothesis on the regularity of the oscillatory boundary to obtain the homogenized limit problem for the three different cases depending on the order of the period of the oscillations.