

DOMAIN PERTURBATION FOR PDES AND APPLICATIONS

Organizer: Alessandra Verri (UFSCar/Brazil) & Marcone C. Pereira (USP/Brazil)

Dirichlet's Laplacian in a straight, stretched and locally twisted waveguide

Diana Carolina Suarez Bello, Alessandra Verri

Universidade Federal de São Carlos

In this seminar we will present results based on the study of the Dirichlet's Laplacian operator spectrum in a straight, stretched and locally twisted waveguide. We will show sufficient conditions that imply the existence of discrete spectrum of the operator in this type of domains.

Dynamics of parabolic equations in domains with a small hole

Elaine Andressa Tavares de Lima, German Lozada Cruz

Universidade de São Paulo

In this lecture we will see the asymptotic dynamics for a class of semilinear parabolic problems with Dirichlet boundary conditions in domains with a small hole of size proportional to a positive parameter ϵ . In other words, we prove that the family of attractors behaves continuously as $\epsilon \rightarrow 0$. We will also provide the convergence rates in terms of the parameter.

Homogenization of the heat equation in a time-oscillatory moving thin domain

Jean Carlos Nakasato, Tatsu-Hiko Miura

University of São Paulo

We study the asymptotic behavior of solutions of the heat equation in a time oscillatory thin domain. We start by determining estimates of solutions in the perturbed domain and then find the effective problem. This is a joint work with Tatsu-Hiko Miura (University of Hirosaki).

On eigenvalue generic properties of the Laplace-Neumann operator

José N. V. Gomes, Marcus A. M. Marrocos

UFSCAR - Departamento de Matemática

We establish the existence of analytic curves of eigenvalues for the Laplace-Neumann operator through an analytic variation of the metric of a compact Riemannian manifold M with boundary by means of a new approach rather than Kato's method for unbounded operators. We obtain an expression for the derivative of the curve of eigenvalues, which is used as a device to prove that the eigenvalues of the Laplace-Neumann operator are generically simple in the space of all C^k Riemannian metrics on M . This implies the existence of a residual set of metrics in this space, which make the spectrum of the Laplace-Neumann operator simple. We also give a precise information about the complementary of this residual set, as well as about the structure of the set of the deformation of a Riemannian metric which preserves double eigenvalues.