

Proyecto SAB2005-0175: Estancia del Profesor Sergey A. Nazarov
(Institute of Mechanical Engineering Problem, Russian Academy of Sciences.
St.-Petersburg. RUSSIA) en régimen de sabático en la Universidad de Cantabria
Responsable del grupo español: M^a Eugenia Pérez
Otros miembros del grupo: Miguel Lobo, Delfina Gómez
Universidad de Cantabria, 2006

The scientific work during the stay in October--December 2006 was held in cooperation with the team "Matemáticas de las Vibraciones" of the University of Cantabria in the four following directions:

- 1. Concentrated masses.**
- 2. Spectral problems with rapidly oscillating boundary conditions.**
- 3. Spectral problems in domain with thin bands.**
- 4. Asymptotics of eigenfrequencies for a cracked body.**

The weekly seminar under the title "Asymptotic analysis of singularly perturbed problems" was held by S. Nazarov on Thursdays to present his new results which were necessary for the nowadays and future work in cooperation with the Santander team. The following questions have been considered:

1. A criterion for existence of trapped modes in a cylindrical waveguide.
2. Asymptotic theory of thin elastic structures (rods and plates).
3. Introduction to the mathematical theory of cracks.

Common work: Papers already published

- M. Lobo, S.A.Nazarov, E. Pérez,
Natural vibrations of a strongly inhomogeneous elastic body:
Asymptotics and uniform estimates of remainders.
Doklady Mathematical Sciences, V.67, N.2, p.1-4, 2003
(Russian: Dokl. Akad. Nauk. 389, no.2, p. 173-176, 2003)
- M. Lobo, S.A.Nazarov, E. Pérez,
Asymptotically sharp uniform estimates in a scalar stiff problem.
C.R. Mecanique.t. 331, N.5, p.325-330, 2003
- M. Lobo, S.A.Nazarov, E. Pérez,
Eigenoscillations of contrasting non-homogeneous elastic bodies.
Asymptotic and uniform estimates for eigenvalues.
IMA Journal of Applied Mathematics, Vol.7, p. 419-458, 2005.
- D.Gómez, S.A. Nazarov, M. Lobo, E. Pérez,
Spectral stiff problems in domains surrounded by thin bands:
asymptotic and uniform estimates for eigenvalues.
Journal de Mathématiques Pures et Appliquées. V. 85, p. 598-632, 2006
- D.Gómez, S.A. Nazarov, M. Lobo, E. Pérez,
Asymptotics for the spectrum of the Wentzell problem with a small
parameter and other related stiff problems.
Journal de Mathématiques Pures et Appliquées. V. 86, p.369-402, 2006
- D.Gómez, S.A. Nazarov, E. Pérez.
The formal asymptotics of eigenmodes for oscillating elastic spatial
body with concentrated masses.
Zapiski Nauchnyh Seminarov POMI. To appear, 32p., 2007