Hiroshima Mathematical Analysis Seminar No.52

Scattering theory of Lax-Phillips for istoropic elastic wave equations in

a perturbed half space

The elastic wave equations for isotropic medium in a perturbed half space are discussed. In the case, a similar formulation to the one of Lax and Phillips is also obtained. It is based on considering the relation between the scattering theory of Wilcox type (so called "Schrödinger methods for acoustic scattering) and the one of Lax and Phillips. This relation is also valid for an abstract formulation of scattering theories including various hyperbolic problems.

Professor Roberta Dal Passo (Università di Roma)

Operators of Thin-Film Type: Qualitative Properties and Open Problems

This class of (nonlinear degenerate higher order) operators has recently attracted an enormous interest both for its relevance in a number of applications (from fluid dynamics to material sciences) and for its mathematical significance as relatively uncharted territory in the theory of PDE's.
We will mainly focus on the thin-film equation, which serves as a model problem:

$$u_t + \mathrm{div}(|u|^n \nabla \Delta u) = 0 \quad \text{in} \quad \mathbb{R}^+ \times \Omega.$$

The mathematical investigation has revealed a great richness of structure, but still several challenging problems remain open, which will be discussed in the talk.

Professor Michiel Bertsch (University of Rome Tor Vergata)

On biological populations that avoid crowding

The lecture focusses on a general model introduced by Gurtin and MacCamy and studied in some special cases in collaboration with several authors (Gurtin, Hilhorst, Peletier). The most interesting phenomenon which will be discussed is that in certain cases initially seperated populations remain separated in future times. This gives rise to an interesting free boundary problem, and among other results regularity of the free boundary is obtained in the 1D case.

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