



PROBLÈMES EN DOMAINES NON BORNÉS : ANALYSE MATHÉMATIQUE ET SIMULATION

PHYSICAL PROBLEMS IN UNBOUNDED MEDIA : MATHEMATICAL ANALYSIS AND NUMERICS

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| Lecturers : 10.0 | TC : 6.0 | PW : 0.0 | Autonomy : 0.0 | Study : 12.0 | Project : 0.0 | Language : MI

Objectives

This course aims at giving the mathematical foundations for the study of partial differential equations posed in an unbounded domain. We will focus on model equations (Laplace, Helmholtz, wave equation) to present the mathematical framework and the main ideas for the design of numerical methods.

Keywords : Propagation phenomena. Partial differential equations. Unbounded domains.

Programme

Part I : Basic facts for stationary and harmonic problems

Part II : Time dependent problems

Part III : Focus on the Helmholtz problem in the free space

Learning outcomes

- To be able to identify conditions for closing a problem in an unbounded domain.
- To be able to design a numerical method for PDEs in unbounded domains.
- To be able to quantify the accuracy of such a numerical method.

Independent study

Objectifs : Basics on finite elements softwares.
Practice on methods developed during lectures.

Méthodes : Application exercises.

Core texts

J.-C. Nédélec, *ACOUSTIC AND ELECTROMAGNETIC EQUATIONS*, Springer, 2001
D. Givoli *NUMERICAL METHODS FOR PROBLEMS IN INFINITE DOMAINS*, Elsevier, 1992
L. Lehmann *WAVE PROPAGATION IN INFINITE DOMAINS*, Springer, 2007

Assessment

Grade = 50% knowledge + 50% knowhow
Knowledge grade = 100% final exam
Knowhow grade = 100% continuous assessment