

# COLLOQUIUM

Salle des Conférences de l'IECN

Mardi 19 Octobre 1999 à 17H00

Enrique Zuazua

Universidad Complutense, Madrid

## Continous and Semi-discrete Waves

In this lecture we shall present some recent results on the analysis of 1-d models of wave propagation in semi-discrete media. We shall mainly focus on the effect of the spurious high frequency oscillations on properties like the speed of propagation of waves and the boundary observability. The later arises naturally in the context of Control Theory and Inverse Problems.

Although the speed of propagation is infinite for any finite-dimensional system of ODE, we shall see that, as the space discretization step of the wave equation tends to zero, in some sense, the velocity of propagation of waves in the semi-discrete media tends to zero. This indicates that, although for fixed initial data solutions of the semi-discrete system tend to the solutions of the continuous wave equation, this convergence is not uniform enough to guarantee the possibility of observing wave propagation phenomena with unknown initial data by analyzing the semi-discrete model.

We shall present some filtering techniques to overcome this difficulty.

Our lecture will be mainly of expository nature and unnecessary technicalities will be avoided. Therefore, the requirements to follow the lecture will be the basic elements of ODE, PDE and Analysis.