SCMS Seminar

CONTROL AND AVERAGING

Prof. Enrique Zuazua

Universidad Autónoma de Madrid

Time: 10:00-11:00 am., Friday, November 27, 2015

Venue: Room 2201, East Main Guanghua Tower, Handan Campus

Abstract: This lecture is devoted to discuss how averaging methods may interact with control problems.

First we address the problem of controlling uncertain systems submitted to parametrized perturbations. We introduce the notion of averaged control according to which one aims to control the average of the states with respect to the parameters. We observe that this property is equivalent to a suitable averaged observability one.

We first discuss this property in the context of finite-dimensional systems to later consider Partial Differential Equations (PDE), mainly, of wave and parabolic nature. This analysis will lead to unexpected results on the robustness of observability estimates with respect to additive perturbations.

We shall also show that the averaging process with respect to the unknown parameter may lead a change of type on the PDE under consideration from hyperbolic to parabolic, for instance, significantly affecting the expected control theoretical properties.

We shall also comment on the links of these results with earlier ones by Li Ta Tsien and collaborators on the synchronization of systems.

We shall also present how averaging with respect to some randomisation parameter may led to a spectral simplification of problems on the optimal location of sensors and actuators.

We will also present some open problems and perspectives of future developments.

This work has been developed in collaboration with J. Lohéac, M. Lazar, Q. Lü, Y. Privat and E. Trélat.