FMSP Lectures

Piermarco Cannarsa
(University of Rome Tor Vergata)

Bilinear control for evolution equations of parabolic type

February 14 (Fri) , 17:00 ～ 18:00 Room 128

Abstract:

Recently, in a series of joint papers with F. Alabau-Boussouira and C. Urbani, I have studied the response of an evolution equation on a Hilbert space to the action of a bilinear control. As is well-known, a bilinear control is a scalar function of time multiplying one of the coefficient of the equation (usually, a lower order term). Therefore, this is a nonlinear control problem, even if the equation is linear in the state variable.

For such a problem, exact controllability is out of question, due to a well-known negative result by Ball, Marsden, and Slemrod back in the 80's.

In this talk, equations of parabolic type will be considered, meaning that the infinitesimal generator - of the strongly continuous semigroup which drives the system - is assumed to be a self-adjoint accretive operator. It will be explained how, under some conditions relating the spectrum of the generator to the control coefficient, one can locally stabilise the system to the solution associated with the ground state at a doubly exponential speed, or even attain such a ground-state solution in finite time. Applications to concrete parabolic problems will also be provided.