

IMAR Monthly Lecture

Robust stabilization of parabolic differential systems

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Abstract: Robust stability is the property of a system to remain stable in the presence of variations of its parameters, ensuring that the system operates reliably under different conditions. In control theory the appropriate technique to design robust stabilizing feedback controllers that force a system to achieve stability with a prescribed performance even if the system output may be corrupted by perturbations is the H-infinity optimal control problem. Previous results in the literature show the connection between the feedback controller solving the H-infinity optimal control problem and the solution to an algebraic Riccati equation involving the operators associated to the system to be controlled. After discussing some basic idea about the H-infinity optimal control problem we present a variational and an operatorial method for proving the existence and uniqueness of the solution to the algebraic Riccati equation associated to parabolic systems. The latter is developed in Hilbert-Schmidt spaces and allows a direct construction of a numerical solution to the Riccati equation by an approximating technique. Some applications are discussed at the end.