



UCD School of
Mathematics and Statistics

University College Dublin
Belfield, Dublin 4, Ireland

Tel +353 1 716 2580
Fax +353 1 716 1196

Scoil na
Matamaitice agus na Staitisticí UCD

An Coláiste Ollscoile, Baile Átha Cliath
Belfield, Baile Átha Cliath 4, Éire

Email seminars@maths.ucd.ie
Web maths.ucd.ie/seminars

Algebra and Number Theory Seminar

Helena Smigoc (UCD)

will speak on

Switched systems, common solution to the Lyapunov equation and semidefinite programming

Mon 8th October 2007 at 4:00PM

Location: Mathematical Sciences Seminar Room

matrix A is called (Hurwitz) stable if all its eigenvalues lie in the open left half of the complex plane. If A is a stable matrix, then the linear time-invariant system for A is stable. A classical result of Lyapunov states that a matrix A is stable if and only if for arbitrary Hermitian positive definite Q , the Lyapunov equation $AP + PA^* = -Q$ admits a positive definite solution P .

By a switched system we mean a dynamical system consisting of a family of linear time-invariant systems and a rule that orchestrates the switching between them. To guarantee a stability of such switched systems under arbitrary switching signals, it is sufficient to show that there exists a common solution to the Lyapunov equations associated with all the linear time-invariant systems defining the switched system.

Determining the existence of a common solution to the Lyapunov equation for a finite set of linear time-invariant systems is very difficult. In this talk we will discuss some special cases for which nice easily checkable conditions can be found. In particular, we will present a solution for 2×2 matrices and for matrices whose difference has rank one. We will show how methods from semidefinite programming can be applied to this problem.

This talk is part of the **Algebra and Number Theory** series. For more, see



**UCD School of
Mathematics and Statistics**

University College Dublin
Belfield, Dublin 4, Ireland

Tel +353 1 716 2580
Fax +353 1 716 1196

**Scoil na
Matamaitice agus na Staitisticí UCD**

An Coláiste Ollscoile, Baile Átha Cliath
Belfield, Baile Átha Cliath 4, Éire

Email seminars@maths.ucd.ie
Web maths.ucd.ie/seminars

<https://maths.ucd.ie/seminars>