

Introduction to Algebraic Control Theory: From finite to infinite-dimensional systems

Summer School (15-19/09/03)

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1 Monday, September 15th: Frequency-domain approach

- 08.00-08.30: Opening.
- 08.30-10.30: **Talk:** Introduction to frequency-domain approach (J.-J. Loiseau).
- 10.45-12.30: **Talk:** Robust stability (S.-I. Niculescu).
- 13.00: Lunch.
- 14.30-15.30: **Paper:** Diophantine equations in control theory – A survey, V. Kučera, *Automatica*, vol. 29 (1993), 1361-1375.
- 15.45-17.15: **Paper:** An introduction to internal stabilization of infinite-dimensional linear systems, A. Quadrat, notes of International School in Automatic Control of Lille (02-06/09/02): Control of distributed parameter systems: theory and applications.
- 17.30-18.30: **Talk:** Systemic K -theory (A. Quadrat).
- 20.00: Night session.

2 Tuesday, September 16th: State-space approach

- 08.30-10.00: **Talk:** Introduction to state-space methods and H_2/H_∞ -optimal control.
- 10.15-11.15: **Paper:** Semidefinite programming, L. Vandenberghe, S. Boyd, *SIAM Review*, vol. 38 (1996), 49-95.
- 11.30-12.30: **Paper:** Robust decision problems in engineering: A linear matrix inequality approach, L.El Ghaoui, S.-I. Niculescu, in *Advances in Linear Matrix Inequality Methods in Control* SIAM: Philadelphia, (1999), 3-37.
- 12.45: Lunch.
- 14.00-15.30: **Talk:** Liapunov methods in stability and control of delay and propagation systems (S.-I. Niculescu).
- 15.45-16.15: **Talk:** Historical introduction on the use of distributed delays (J.-J. Loiseau).
- 16.20-17.50: **Paper:** Algebraic tools for the control and stabilization of time-delay systems, J.-J. Loiseau, *Annual Reviews in Control*, vol. 24 (2000), 135-149.

- 18.00-18.30: **Talk:** Further comments on control synthesis algorithms using distributed delays (J.-J. Loiseau).

- 20.00: Night session.

3 Wednesday, September 17th: Systems over rings

- 08.30-10.00: **Paper:** Geometric theory of linear systems, F. Hamano, in “The Control Handbook”, W. S. Levine editor, CRC Presss, 1996, 469-480.

- 10.15-11.45: **Paper:** Linear systems over commutative rings: a survey, E. D. Sontag, *Richerche di Automatica*, vol. 7 (1976), 1-34.

- 12.00-13.00: **Paper:** Systems over rings: geometric theory and applications, G. Conte et A. M. Perdon, *Annual Reviews in Control* 24 (2000), 113-124.

- 20.00: Night session.

4 Thursday, September 18th: Module-theoretic approach

- 08.30-09.30: **Paper:** Controllability and observability of linear delay systems: an algebraic approach, M. Fliess, H. Mounier, *ESAIM COCV*, vol. 3 (1998), 301-314.

- 09.45-10.45: **Paper:** Equivalences of linear control systems, J. F. Pommaret, A. Quadrat, *MTNS 2000*, Perpignan (France), CDRom.

- 11.00-12.00: **Paper:** A functorial approach to the behaviour of multidimensional control systems, J. F. Pommaret, A. Quadrat, *Mathematics of Control, Signal and Systems*, vol. 13 (2003), pp. 193-215.

- 12.30: Lunch.

- 14.30-15.45: **Talk:** An introduction to the behavioural approach to multidimensional systems (E. Zerz).

- 16.00-17.30: **Talk:** Linear control systems over Ore algebras. Effective algorithms for the computation of parametrizations, F. Chyzak, A. Quadrat, D. Robertz, *Workshop on Time-Delay Systems (TDS03)*, INRIA Rocquencourt (France) (08-10/09/03) (D. Robertz).

- 17.45-18.30: **Talk:** A behavioural interpretation to the operator-theoretic approach to linear control systems (A. Quadrat).

- 20.00: Night session.

5 Friday, September 19th: Systems over tropical algebras

- 08.30-10.30: **Paper:** Algebraic tools for the performance evaluation of discrete event systems, G. Cohen, P. Moller, J.P. Quadrat, M. Viot, *IEEE Proceedings: Special issue on Discrete Event Systems* 77 (1989).

- 10.45-12.45: **Paper:** The control of discrete-event systems, P. J. Ramadge, W. M. Wonham, *IEEE Trans. Autom. Contr.*, vol. 77 (1989), 81-98.

- 13.00: Lunch.

- 14.30-16.30: **Paper:** Rational semimodules over the max-plus semiring and geometric approach of discrete event systems, S. Gaubert, R. Katz, INRIA-RR-4519, août 2002.