

CURRICULUM VITAE

Carlo Piccardi

Dipartimento di Elettronica, Informazione e Bioingegneria
Politecnico di Milano
Piazza Leonardo da Vinci, 32
20133 Milano, Italy

tel (+39) 02 2399 3566

fax (+39) 02 2399 3412

e-mail carlo.piccardi@polimi.it

webpage <http://home.deib.polimi.it/piccardi/>

Carlo Piccardi was born in 1962. He is a Full Professor of Systems and Control at the Politecnico di Milano. His teaching activity is in the area of dynamical systems (linear and nonlinear) and automatic control, both to undergraduate and graduate students of the Politecnico schools of engineering. He also regularly teaches for the doctorate program in Information Technology, mostly in the area of nonlinear dynamics and complex systems.

His research interests are focused on several topics concerning nonlinear dynamics and complex systems. Some recent areas of research are:

- Structural properties of networks, with applications in economics and finance;
- Spreading processes on complex networks, with applications to epidemiology;
- Synchronization of networks of dynamical systems;
- Reduced models for systems with low dimensional chaos, and their use for solving control and parameter estimation problems;
- Application of optimal control techniques to chaotic systems;
- The use of numerical methods for bifurcation analysis of nonlinear systems, including continuation methods and harmonic-balance techniques;
- The analysis of structural properties of cooperative systems.

Carlo Piccardi is a member of the steering committee of the Italian Society for Chaos and Complexity (SICC), for which he co-organized in recent years many schools and workshops on various topics related to nonlinear dynamics and their applications.

COURSES

Undergraduate courses

Systems Theory (1996/97 - 2001/02),
Fundamentals of Systems and Control (2000/01 - 2013/14)
Deterministic Chaos and Applications (2003/04 - 2008/09)
Cooperative Systems (2004/05 - 2007/08)
Dynamics of Complex Systems (2009/10 - 2010/11)

Doctorate courses

Positive Linear Systems (1994)
Nonlinear Dynamics: Stability, Bifurcations, and Chaos (1995 - 2009)
Paradigmatic Models in Social Sciences (2003, 2012)

Spatial Dynamics in Biological Problems (2009)

Analysis of Complex Networks: Structure and Dynamics (2010, 2013)

PUBLICATIONS

Papers on peer-reviewed international journals

- F. Della Rossa, F. Dercole, C. Piccardi, Profiling core-periphery network structure by random walkers, *Scientific Reports*, 3, 1467, 2013.
- F. Della Rossa, G. Mastinu, C. Piccardi, Bifurcation analysis of an automobile model negotiating a curve, *Vehicle System Dynamics*, 50(10), 1539-1562, 2012.
- C. Piccardi e L. Tajoli, Existence and significance of communities in the World Trade Web, *Physical Review E*, 85(6), 066119/1-12, 2012.
- C. Piccardi, Finding and testing network communities by lumped Markov chains, *PLoS ONE*, 6(11), e27028, 2011.
- G. Contreras, S. Goidanich, S. Maggi, C. Piccardi, M.V. Diamanti, M.P. Pedferri, L. Lazzari, Representing localized corrosion processes through cellular automata, *Corrosion Reviews*, 29(5-6), 241-245, 2011.
- C. Piccardi, L. Calatroni, F. Bertoni, Clustering financial time series by network community analysis, *International Journal of Modern Physics C*, 22(1), 35-50, 2011.
- C. Piccardi, L. Calatroni, F. Bertoni, Communities in Italian corporate networks, *Physica A*, 389(22), 5247-5258, 2010.
- I. Belykh, C. Piccardi, S. Rinaldi, Synchrony in tritrophic food-chain metacommunities, *Journal of Biological Dynamics*, 3(5), 497-514, 2009.
- C. Piccardi, R. Casagrandi, Inefficient epidemic spreading in scale-free networks, *Physical Review E*, 77(2), 026113/1-4, 2008.
- C. Piccardi, Parameter estimation for systems with peak-to-peak dynamics, *International Journal of Bifurcation and Chaos*, 18(3), 745-753, 2008.
- C. Piccardi, On parameter estimation of chaotic systems via symbolic time series analysis, *Chaos*, 16(4), 043115/1-10, 2006.
- C. Piccardi, S. Rinaldi, A method for parameter estimation in Lur'e systems, *International Journal of Bifurcation and Chaos*, 16(5), 1461-1470, 2006.
- C. Piccardi, On the control of chaotic systems via symbolic time series analysis, *Chaos*, 14(4), 1026-1034, 2004.
- G. Torri, S. Rinaldi, C. Piccardi, Imperfect phase synchronization in the locomotor behavior of *Halobacterium salinarium*, *International Journal of Bifurcation and Chaos*, 13(10), 3085-3092, 2003.
- L. Ghezzi, C. Piccardi, Stock valuation along a Markov chain, *Applied Mathematics and Computation*, 141(2-3), 385-393, 2003.
- C. Piccardi, S. Rinaldi, The impact of noise and sampling frequency on the control of peak-to-peak dynamics, *International Journal of Bifurcation and Chaos*, 13(6), 1579-1586, 2003.
- C. Piccardi, S. Rinaldi, Control of complex peak-to-peak dynamics, *International Journal of Bifurcation and Chaos*, 12(12), 2927-2936, 2002.
- C. Piccardi, S. Rinaldi, Remarks on excitability, stability and sign of equilibria in cooperative systems, *Systems and Control Letters*, 46(3), 153-163, 2002.
- C. Piccardi, G. Feichtinger, Peak-to-peak dynamics in the dynastic cycle, *Chaos, Solitons and Fractals*, 13(2), 195-202, 2002.
- C. Piccardi, Controlling chaotic oscillations in delay-differential systems via peak-to-peak maps, *IEEE Transactions on Circuits and Systems I*, 48(8), 1032-1037, 2001.
- S. Rinaldi, C. Piccardi, A. Gragnani, Pest outbreaks control: the approach of peak-to-peak dynamics, *Natural Resource Modeling*, 14(1), 177-195, 2001.
- C. Piccardi, S. Rinaldi, Optimal control of chaotic systems via peak-to-peak maps, *Physica D*, 144(3-4), 298-308, 2000.

- C. Piccardi, S. Lazzaris, Vaccination policies for chaos reduction in childhood epidemics, *IEEE Transactions on Biomedical Engineering*, 45(5), 591-595, 1998.
- C. Piccardi, L. Ghezzi, Optimal control of a chaotic map: fixed point stabilization and attractor confinement, *International Journal of Bifurcation and Chaos*, 7(2), 437-446, 1997.
- L. Ghezzi, C. Piccardi, PID control of a chaotic system: an application to an epidemiological model, *Automatica*, 33(2), 181-191, 1997.
- C. Piccardi, Harmonic balance analysis of codimension-2 bifurcations in periodic systems, *IEEE Transactions on Circuits and Systems I*, 43(12), 1015-1018, 1996.
- C. Piccardi, On taming chaos using LTI filters, *IEEE Transactions on Circuits and Systems I*, 43(5), 431-432, 1996.
- G. Feichtinger, C. Forst, C. Piccardi, A nonlinear dynamical model for the dynastic cycle, *Chaos, Solitons and Fractals*, 7(2), 257-271, 1996.
- C. Piccardi, Bifurcation analysis via harmonic balance in periodic systems with feedback structure, *International Journal of Control*, 62(6), 1507-1515, 1995.
- G. Feichtinger, L. Ghezzi, C. Piccardi, Chaotic behavior in an advertising diffusion model, *International Journal of Bifurcation and Chaos*, 5(1), 255-263, 1995.
- S. Muratori, C. Piccardi, S. Rinaldi, On the zeros of interconnected positive linear systems, *International Journal of Systems Science*, 25(12), 2255-2263, 1994.
- C. Piccardi, Bifurcations of limit cycles in periodically forced nonlinear systems: the harmonic balance approach, *IEEE Transactions on Circuits and Systems I*, 41(4), 315-320, 1994.
- Y. Kuznetsov, C. Piccardi, Bifurcation and chaos in a periodically forced prototype adaptive control system, *Kybernetika*, 30(2), 121-128, 1994.
- Y. Kuznetsov, C. Piccardi, Bifurcation analysis of periodic SEIR and SIR epidemic models, *Journal of Mathematical Biology*, 32, 109-121, 1994.
- A. Nardini, C. Piccardi, R. Soncini-Sessa, A decomposition approach to suboptimal control of discrete-time systems, *Optimal Control Applications and Methods*, 15, 1-12, 1994.
- C. Piccardi, Infinite-horizon periodic minimax control problem, *Journal of Optimization Theory and Applications*, 79(2), 397-404, 1993.
- C. Piccardi, Infinite-horizon minimax control with pointwise cost functional, *Journal of Optimization Theory and Applications*, 78(2), 317-336, 1993.
- C. Piccardi, Finite-horizon optimal control with pointwise cost functional, *Applied Mathematics and Computation*, 52(2-3), 345-353, 1992.
- S. Muratori, C. Piccardi, S. Rinaldi, On the minimum phase of compartmental systems, *International Journal of Control*, 56(1), 23-34, 1992.
- A. Nardini, C. Piccardi, R. Soncini-Sessa, On the integration of risk-aversion and average-performance optimization in reservoir control, *Water Resources Research*, 28(2), 487-497, 1992.
- C. Piccardi, G.P. Bottoni, On the solution of reservoir optimal control problems by means of vector computers, *Environmental Software*, 6(1), 24-28, 1991.
- C. Piccardi, R. Soncini-Sessa, Stochastic dynamic programming for reservoir optimal control: dense discretization and inflow correlation assumption made possible by parallel computing, *Water Resources Research*, 27(5), 729-741, 1991.
- R. Soncini-Sessa, J. Zuleta, C. Piccardi, Remarks on the application of a risk-averse approach to the management of El Carrizal reservoir, *Advances in Water Resources*, 13(2), 76-84, 1990.
- C. Piccardi, R. Soncini-Sessa, An interactive program to simulate the management of a multipurpose water reservoir, *Environmental Software*, 4(3), 142-149, 1989.

Book chapters

- G. Mastinu, F. Della Rossa, C. Piccardi, Nonlinear Dynamics of a Road Vehicle Running into a Curve, in: S. Banerjee et al. (eds.), *Applications of Chaos and Nonlinear Dynamics in Science and Engineering* (serie *Understanding Complex Systems*), Springer, 125-153, 2012.
- C. Piccardi, R. Casagrandi, Remarks on epidemic spreading in scale-free networks, in: A. Chiuso, L. Fortuna, M. Frasca, A. Rizzo, L. Schenato, S. Zampieri (eds.), *Modelling, Estimation and Control of Networked Complex Systems* (serie *Understanding Complex Systems*), Springer, 77-89,

2009.

- C. Piccardi, S. Rinaldi, Control and parameter estimation of systems with low-dimensional chaos – The role of peak-to-peak dynamics, in: R. Caponetto, L. Fortuna, M. Frasca (eds.), *Advanced Topics on Cellular Self-organizing Nets and Chaotic Nonlinear Dynamics to Model and Control Complex Systems* (serie *World Scientific Series on Nonlinear Science, Series A*, vol. 63), 101-122, World Scientific, 2008.
- C. Piccardi, S. Rinaldi, Model reduction for systems with low-dimensional chaos, in: F. Colonius e L. Gruene (eds.), *Dynamics, Bifurcations and Control* (serie *Lecture Notes in Control and Information Sciences*, vol. 273), 255-268, Springer-Verlag, 2002.

Milano, 25/9/2013