

Brief Curriculum vitae 2006

Gouzé Jean-Luc

Senior researcher

Directeur de Recherches INRIA (the French National Institute for Research in Computer Science and Control) <http://www.inria.fr>

Head of the Comore (Modelling and Control of Renewable Resources) team

Organization: INRIA, France

Unit: Sophia Antipolis

Team: Projet Comore

Address: Comore, INRIA Sophia Antipolis, 2004, route des Lucioles, B.P. 93 06902 Sophia-Antipolis Cedex, France

E-mail: gouze@sophia.inria.fr

Telephone: 33 4 92 38 78 75

Fax: 33 4 92 38 78 58

Web page (my team): <http://www.inria.fr/recherche/equipes/comore.en.html>

Web page (personal): <http://www-sop.inria.fr/comore/Personnel/JLGouze-eng.html>

Main Research interests

biomathematics, mathematical modelling of biological phenomena, population dynamics, ordinary differential equations, theory of non-linear systems and control, optimal management of renewable resources.

Academic experience

1997 Research Director (Directeur de Recherche) INRIA, COMORE research group

1996 Head of COMORE research group (Modelling and Control of Renewable Resources), INRIA

1996 Tenure (Habilitation à diriger les recherches) (University of Nice)

title: Qualitative mathematical analysis of biological models

Board : J. Demongeot, R. Arditi, C. Lobry, E. Walter, P. Bernhard, P. Nival, A. Sciandra.

1983-1995 Researcher (Chargé de recherches) at INRIA, (Institut National de Recherches en Informatique et en Automatique) Sophia-Antipolis
MIAOU research group (Control theory)

1980-1983 Doctoral Thesis from the Paris XI University
Advisors: J.P. Changeux (neurobiologist, Institut Pasteur) and J.M. Lasry (mathematician, Paris IX)
"Sur la structuration de la jonction neuromusculaire; régression de la multiinnervation pendant le développement; modèle mathématique et simulation" (mathematical model of synaptic network)

Research programs, grants, industrial collaborations (2000 - 2006)

ARC GDyn (2002-2004)

Coordination of the action GDyn with H. de Jong (HELIX INRIA). The aim is the analysis of dynamical piecewise linear models of genetic regulatory networks (see <http://www-sop.inria.fr/comore/arcgdyn/arcgdyn-eng.html>). The ARC involves mathematicians, computer scientists, and biologists from the E.N.S. Ulm Paris, the INRIA Rhone-Alpes, Rocquencourt and Sophia-Antipolis, the Haute Alsace University (Mulhouse) and the Joseph Fourier University (Grenoble).

Action ACI IMPBIO BacAttract (2004-2006)

Action funded by the Ministère de la Recherche. The aim is the mathematical modelling and analysis of some well known gene networks.

Action ACI IMPBIO MathResoGen (2004-2006)

Mathematical modelling of genetic and metabolic networks

AS Asinbio (2002-2004)

Participant in the Action Spécifique "Observers for systems with unknown inputs" of the RTP50 "STIC et Environnement" funded by the CNRS.

TELEMAC: 2001-2005

Participation in the European project (with industrial partners) TELEMAC (Tele-monitoring and Advanced Tele-control of High-Yield Wastewater Treatment Plants); coordinated by O. Bernard (Comore) from the scientific point of view and B. Le Dantec (Ercim) for administration (see <http://www.ercim.org/telemac>). Partners are ERCIM, INRIA COMORE, INRA (Laboratoire des Biotechnologies de l'environnement, Narbonne), APPLITEK (captors, Belgium), Department of Applied Mathematics, Biometrics and Process Control, Gent University, Belgique), Council for the Central Laboratory of the Research Councils (CCLRC), Information Technology Department, (England), SPES (Information technologies, Italy), University of Santiago de Compostella (USC)(Spain), ENEA Waste water Treatment and Water Cycle Unit (Italy), AGRALCO (Spain), PSPc (Belgium), Tequila SAUZA S.A. (Mexico), The University of Guadalajara (UDG) (Mexico), ALLIED DOMEQ SPIRITS and WINE LTD. (DOMEQ UK), Allied Domecq Brasil Industria e Comercio Limitada (Brazil). The total budget was around 4.5 Meuros.

European project HYGEIA (2005-2007)

HYGEIA (Hybrid Systems for Biochemical Network Modeling and Analysis) is a NEST ADVENTURE STREP European project. The objective of HYGEIA is to exploit recent developments in the area of hybrid systems to address open problems in modeling and analysis of biochemical networks. Participants: Sosso,

Helix, Comore (INRIA) Patras Univ. (Greece), European Molecular Biology Laboratory (Heidelberg) ,
Rockefeller University (New-York).

European Network of Excellence HYCON(2005-2007)

The objective of the NoE HYCON (Hybrid Control: Taming Heterogeneity and Complexity of Networked Embedded Systems) is establishing a durable community of leading researchers and practitioners who develop and apply the hybrid systems approach to the design of networked embedded control systems as found, e.g., in industrial production, transportation systems, generation and distribution of energy, communication systems, genetic systems (see <http://www.ist-hycon.org/>.)

PhD students (2000 - 2006)

G. Robledo, (2006) «Modélisation et analyse de réseaux trophiques» (mathematical analysis of trophic networks)

V. Lemesle, *Modélisation mathématique structurée de la croissance cellulaire en chemostat : analyse et estimation* (Structured mathematical models for cellular growth in the chemostat) thèse de doctorat, UNSA, 2004

L. Mailleret, *Stabilisation globale de systèmes dynamiques positifs mal connus ; applications en biologie.* (Global stabilization of positive uncertain dynamical systems in biology) thèse de doctorat, UNSA, 2004

M. Verdoit, *Caractérisation et modélisation de la dynamique spatiale et saisonnière de populations benthiques et démersales exploitées de la mer Celtique* (Models for spatial dynamics of fishes) thèse de doctorat, université P.M. Curie, 2003

J. Arino, *Modélisation structurée de la croissance du phytoplancton en chemostat* (Structured models for phytoplankton growth in the chemostat) thèse de doctorat, université Joseph Fourier, 2001.

Teaching activities

Mathematical models in biology at the DEA of biological oceanography from the University Pierre et Marie Curie, Paris VI.

Modeling and control of bioprocesses at ISIA (Institut Supérieur en Informatique et Automatique, École des Mines de Paris).

CIMPA school in Tlemcen (Algérie, 2003) and Nouakchott (Mauritania, 2005); models of bioprocesses and fisheries.

School/workshop on mathematics and renewable resources at the Centro de Modelamiento Matematico of the Universidad de Chile (in Santiago, Chile, two weeks in April 2004).

Regular formations of mathematics and mathematical modelling to biologists (researchers) at INRA Lusignan.

Other activities

Organization of the evaluation of the BIO theme at INRIA, see <http://www-sop.inria.fr/comore/evaluation/>

Reviewer for SIAM Appl. Maths, Mathematical Biosciences, J. Process Control, J. Math. Biology, Systems and Control Letter, ... and conferences.

Participation in committees for PhD theses (regularly).

Program committee for (recently) POSTA2006 (Second Multidisciplinary International Symposium on Positive systems, theory and applications, Grenoble 2006), CIFA (Conférence Internationale Francophone d'Automatique Bordeaux 2006), "Modélisation dynamique de réseaux biologiques" C.I.R.M. (Centre International de Rencontres Mathématiques) à Marseille-Luminy, du 9 au 13 mai 2005.

Expert committee for Aquae INRA/Cemagref projects, for RTP50 CNRS "STIC et Environnement".

Member of the the Commission Scientifique Spécialisée MBIA (evaluation committee for Mathematics, Biometry and AI) of INRA, that evaluates the scientific career of INRA researchers.

Member of the Commission d'Evaluation (scientific committee for the evaluation of researchers) of INRIA (until 2005).

Publications

Journals (1997 - 2006)

- [1] Casey, R., de Jong, H., and Gouzé, J.-L. (2006). Piecewise-linear models of genetic regulatory networks: Equilibria and their stability. *Journal of Mathematical Biology*, 52:27-56.
- [2] Gouzé, J.-L. and Robledo, G. (2005a). Feedback control for nonmonotone competition models in the chemostat. *Nonlinear Analysis: Real World Applications*, 6:671-690.
- [3] Gouzé, J.-L. and Robledo, G. (2005b). Robust control for an uncertain chemostat model. To appear in *International Journal of Robust and Nonlinear Control*.
- [4] Lemesle, V. and Gouzé, J. L. (2005a). A biochemically based structured model of phytoplankton growth in the chemostat. *Ecological Complexity*, 2:21-33.
- [5] Lemesle, V. and Gouzé, J. L. (2005b). An hybrid bounded error observer for uncertain bioreactor models. *Bioprocess and Biosystems Engineering*, 27:311-318.
- [6] Mailleret, L., Gouzé, J.-L., and Bernard, O. (2005). Nonlinear control for algae growth models in the chemostat. *Bioprocess and Biosystem Engineering*, 27:319-327.
- [7] H. de Jong, J.-L. Gouzé, C. Hernandez, M. Page, T. Sari, and H. Geiselmann (2004). Qualitative simulation of genetic regulatory networks using piecewise-linear models. *Bull. Math. Biol*, 66:301-340.
- [8] O. Bernard and J.-L. Gouzé (2004). Closed loop observers bundle for uncertain biotechnological models. *J. Process. Contr.*, 14:7:765-774.
- [9] J.-L. Gouzé and T. Sari (2003). A class of piecewise linear differential equations arising in biological models. *Dynamical systems*, 17:299-316.
- [10] Rapaport, A. and Gouzé, J.-L. (2003). Parallelotopic and practical observers for nonlinear uncertain systems. *Int. Journal. Control*, 76:237-251.

- [11] Arino, J., Gouzé, J.-L., and Sciandra, A. (2002). A discrete, size-structured model of phytoplankton growth in the chemostat. Introduction of non constant cell division. *J. Math. Biol.*, 45:313–33.
- [12] Arino, J. and Gouzé, J.-L. (2002). A size-structured, non conservative ODE model of the chemostat. *Mathematical Biosciences*, 177-178:127–145.
- [13] Bernard, O. and Gouzé, J.-L. (2002). Global qualitative behavior of a class of nonlinear biological systems: application to the qualitative validation of phytoplankton growth models. *Artif. Intel.*, 136:29–59.
- [14] Hadj-Sadok, M. Z. and Gouzé, J. L. (2001). Estimation of uncertain models of activated sludge process with interval observers. *Journal of Process Control*, 11(3):299–310.
- [15] Karama, A., Bernard, O., Gouzé, J., Benhammou, A., and Dochain, D. (2001). Hybrid neural modelling of an anaerobic digester with respect to biological constraints. *Wat. Sci. Technol.*, 43(7):1–8.
- [16] Touzeau, S. and Gouzé, J.-L. (2001). Regulation of a fishery: from a local optimal control problem to an “invariant domain” approach. *Natural Resource Modeling*, 14(2):311–333.
- [17] Gouzé, J. L., Rapaport, A., and Hadj-Sadok, Z. (2000). Interval observers for uncertain biological systems. *Ecological modelling*, 133:45–56.
- [18] Bernard, O. and Gouzé, J.-L. (1999). Nonlinear qualitative signal processing for biological systems: application to the algal growth in bioreactors. *Mathematical Biosciences*, 157:357–372.
- [19] Touzeau, S. and Gouzé, J.-L. (1998). On the stock-recruitment relationships in fish population models. *Environmental modelling and assessment*, 3:87–93.
- [20] Gouzé, J.-L. (1998). Positive and negative circuits in dynamical systems. *Journal Biol. Syst.*, 6(1):11–15.

Book chapters

- [1] Batt, G., Casey, R., de Jong, H., Geiselman, J., Gouzé, J.-L., Page, M., Ropers, D., Sari, T., and Schneider, D. (2005). Qualitative analysis of the dynamics of genetic regulatory networks using piecewise-linear models. In Pecou, E., Martinez, S., and Maass, A., editors, *Mathematical and Computational Methods in Biology*. Editions Hermann, Paris. To appear.
- [2] Bernard, O. and Gouzé, J.-L. (2001). Estimation d’état, chapitre 4, pages 87–120. D. Dochain, éditeur, *Automatique des bioprocédés*. Hermès Science, Paris.
- [3] Bernard, O. and Gouzé, J.-L. (2002). State estimation for bioprocesses. In A. Agrachev, editor, *Mathematical Control Theory*, pages 813–855, Trieste. ICTP.

Conference proceedings, with review (2003 - 2005)

- [1] Casey, R., de Jong, H., and Gouzé, J.-L. (2005b). Stability of equilibria for piecewise-linear models of genetic regulatory networks. In *Proceedings of the CDC ECC conference*. Sévillla, Spain.
- [2] Grogard, F. and Gouzé, J.-L. (2005). Positive control of lotka-volterra systems. In *Proceedings of the 16th IFAC World Congress*. Prague, Czech Republic.

- [3] O. Bernard and J.-L. Gouzé (2004). Multi-observateurs en boucle fermée pour des modèles biotechnologiques mal connus. In *Proceedings of the CIFA conference*. Douz, Tunisia.
- [4] V. Lemesle and J.-L. Gouzé (2004) Growth models for cells in the chemostat. In *Proceedings of MTNS*. Leuven, Belgie.
- [5] G. Robledo and J.-L. Gouzé (2004) Positive control for competition models with inhibition in the chemostat. In *Proceedings of MTNS*. Leuven, Belgie.
- [6] O. Bernard and J.-L. Gouzé (2004) Closed loop observers bundle for uncertain biotechnological models. In *Proceedings of CAB9*. Nancy, F.
- [7] Mailleret, L., Gouzé, J.-L., and Bernard, O. (2003). Nonlinear control for algae growth models in the chemostat. In *Proceedings of the European Control Conference 03*.
- [8] Lemesle, V. and J.-L. Gouzé (2003). A two-dimensional bounded observer for a class of bioreactor model. In *Proceedings of the European Control Conference 03*.
- [9] J.-L. Gouzé. Differential systems with positive variables. In L. Benvenuti, A. D. Santis, and L. Farina, editors, *Positive Systems. Proceedings of the First Multidisciplinary Symposium on Positive Systems (POSTA 2003)*, volume 294 of *Lecture Notes on Control and Information Sciences*, pages 151–158. Springer-Verlag, 2003.

Some French acronyms

ADEME Agence de l'Environnement et de la maitrise de l'Energie
CIMPA Centre International de Mathematiques Pures et Appliquees
CNRS Centre National de la Recherche Scientifique
ENS Ecole Normale Supérieure
ERCIM European Research Consortium for Informatics and Mathematics
I3S Laboratoire Informatique, Signaux et Systèmes de Sophia-Antipolis
INRA Institut National de la Recherche Agronomique
IST Information Society Technologies
LOV Laboratoire d'Océanographie de Villefranche-sur-Mer
STIC Sciences et Technologies de l'Information et de la Communication
UMR Unité Mixte de Recherche
UNSA Université de Nice Sophia Antipolis