

Dmitry Gromov

Name: Dmitry
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Present employment:

Research Assistant at the Technical University of Berlin,
[Control systems group](#).

Research profile:

(Hierarchical) control of complex technical systems, system-theoretical methods, optimal control and optimisation, industrial applications.

Education:

Diploma in electrical engineering from the Belorussian State University of Informatics and Radioelectronics, 1996
Specialization: “Automation and control in technical systems”
PhD at the Technical University of Berlin,
“*Analysis of hierarchical structures for hybrid control systems*”
Thesis supervisor: Prof. J. Raisch
Expected date of submission: April, 2009

Employment:

09.1996 – 10.2001: Teaching assistant at the Belorussian State University of Informatics and Radioelectronics
11.2001 – 03.2003: Scholarship from the Max-Planck-Institut, Magdeburg
04.2003 – 02.2006: Research assistant, Otto-von-Guericke University, Magdeburg
03.2006 – present: Research assistant, Technical University of Berlin.

Research activities:

1. **Control of hybrid systems.** Investigation of various methods for the control of hybrid systems, i.e., those combining discrete and continuous dynamics. Main emphasis was placed on the supervisory and optimal control of hybrid systems.
2. **Design of hierarchical control schemes.** Development of theoretical foundations for the design of hierarchical controllers for complex technical systems (the main contribution of the PhD thesis). Obtained results were successfully used in practice (see below).
3. **Modelling and control of chemical processes.** Many industrial (chemical) processes exhibit very complex mixed discrete/continuous behaviour and therefore require non trivial approaches for the control design. The hierarchical approach appears to be well suited for such problems. There is a short list of applications for which this approach has been proven to be very efficient:
 - Start-up of a multi-stage batch evaporator,
 - Variable structure batch chromatography,
 - Cyclically operated “parallelised” chemical plants with continuous output.
4. **Application of optimal control methods.** Performance optimisation is a central issue in the control system design. I have investigated both analytical aspects (e.g., application of Pontryagin Maximum Principle for the optimal control of batch and semi-batch reactors) and numerical optimisation algorithms (numerical dynamic optimisation with gPROMS package).

Teaching activities:

1. (Co)Supervision of 3 Diploma theses, several student research projects.
2. Exercise classes and occasionally lectures for senior undergraduates.

Projects:

- 2003 – 2005: DAAD Project Vigoni (Exchange program of Italian and German researchers): “*Merging Supervisory and Optimal Control for Hybrid Systems*”
- 2003 – 2008: [HYCON](#), Network of Excellence, HYCON PhD Student
- 2006 – 2008: [DFG Research Group 468](#): “*Methods from Discrete Mathematics for the Synthesis and Control of Chemical Processes*”

Professional societies

Member of the IEEE,
[International Curriculum Option for Doctoral Studies](#)

Other activities:

1. **Reviewer:** IEEE Transactions on Control Systems Technology, Automatica, Control Engineering Practice, Discrete Event Dynamic Systems, Electrical Engineering and a number of conferences.

List of publications:

1. Geist, S., Gromov, D., and Raisch, J.: *Timed discrete event control of parallel production lines with continuous outputs*. Discrete Event Dynamic Systems, Vol. 18(2), pp. 241-262, 2008.
2. Azhmyakov, V., Attia, S.A., Gromov, D., and Raisch, J.: *Necessary Optimality Conditions for a Class of Hybrid Optimal Control Problems*. Proc. 10th Int. Workshop, HSCC 2007, Pisa, Italy, pp. 637-640, 2007.
3. Seatzu, C., Gromov, D., Corona, D., Raisch, J., and Giua, A.: *Optimal control of discrete-time hybrid automata under safety and liveness constraints*. Nonlinear Analysis Vol. 65(6), special issue on Hybrid Systems and Applications (5), pp. 1188-1210, 2006.
4. Gromov, D. and Raisch, J.: *Detecting and enforcing monotonicity for hybrid control systems synthesis*. Proc. 2nd IFAC Conf. on Analysis and Design of Hybrid Systems, Alghero, pp. 395-402, 2006.
5. Gromov, D., Geist, S. and Raisch, J.: *Timed discrete control of a parallel production line with continuous output*. Proc. 2nd IFAC Conf. on Analysis and Design of Hybrid Systems, Alghero, pp. 205-211, 2006.
6. Gromov, D., Mishra, B.V. and Raisch, J.: *Optimal control of batch and semi-batch reactors*. Proc. MMAR2005 - 11th IEEE Int. Conf. on Methods and Models in Automation and Robotics, Międzyzdroje, Poland, 2005. pp. 107-112.
7. Gromov, D., Mayer, E., Raisch, J., Corona, D., Seatzu, C., and Giua, A.: *Optimal control of discrete-time hybrid automata under safety and liveness constraints*. Proc. IEEE 2005 International Symposium on Intelligent Control - ISIC05, pp. 243-249, Limassol, Cyprus, 2005.
8. Corona, D., Seatzu, C., Giua, A., Gromov, D., Mayer, E. and Raisch, J.: *Optimal hybrid control for switched affine systems under safety and liveness constraints*. Proc. CACSD - IEEE Int. Conf. on Computer Aided Control Systems Design, Taipei, Taiwan, 2004, pp. 35-40.
9. Gromov, D. and Raisch, J.: *Hybrid control of a cart-pendulum system with restrictions on the travel*. Proc. PHYSCON2003 - International Conf. Physics and Control, Saint-Petersburg, Russia, 2003, pp. 1231-1235.

Computer skills:

Windows, Linux, LaTeX, Matlab, Mathematica, gPROMS, C.

Languages:

English (fluent), German (fluent), Russian (native)

Hobbies and interests:

Foreign languages and cultures, history, travelling.