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Grace S. Deaecto

Education

02/02/2021 **Livre-Docente**, *School of Mechanical Engineering - FEM/UNICAMP*

2010–2011 **Post Doc in Automatic Control**, *Centre de Recherche en Automatique de Nancy (CRAN-CNRS) - France.*

2007–2010 **PhD in Electrical Engineering**, *University of Campinas (UNICAMP) - FEEC.*

2006–2007 **MSc. in Electrical Engineering**, *University of Campinas (UNICAMP) - FEEC.*

2001–2005 **BSc. in Electrical Engineering**, *University of São Paulo State (UNESP) - FEIS.*

PhD Thesis

Title *Synthesis of Switched Dynamic Controllers: Application to Mechanical Systems and DC-DC Power Converters (in portuguese)*

Supervisor Prof. José C. Geromel (Docteur D'État, LAAS-CNRS, 1979)

Financial Support São Paulo Research Foundation–FAPESP

Master Dissertation

Title *Control Synthesis for Dynamic Switched Systems (in portuguese)*

Supervisor Prof. José C. Geromel (Docteur D'État, LAAS-CNRS, 1979)

Financial Support São Paulo Research Foundation–FAPESP

Work Experience

2021– **Associate Professor**, *School of Mechanical Engineering, University of Campinas, FEM/UNICAMP*

2013–2020 **Assistant Professor**, *School of Mechanical Engineering, University of Campinas, FEM/UNICAMP*

2012–2013 **Assistant Professor**, *Institute of Science and Technology, Federal University of São Paulo, ICT/UNIFESP*

Administrative Position

2016–2020 **Head of Computational Mechanics Department**, *FEM/UNICAMP*

Member of the Editorial Board

2023– **IEEE Control Systems Letters**

2022– **Journal of Control, Automation and Electrical Systems**

2018–2024 **Nonlinear Analysis: Hybrid Systems**

Awards & Distinctions

December, 2024 h-index 20, 1315 citations in the ISI Web of Science

November, 2024 Supervisor of Liting He that won the Hertha Ayrton Prize (Best Master Project of Imperial College 2023/2024)

2021–2025 Affiliate Member of Brazilian Academy of Sciences (ABC)

2023–2025 Member of the Direction Board of the Brazilian Society of Automatics (SBA)

2021–2023 Chair of the Technical Commitee of Automaitc Control in the Brazilian Society of Automatics (SBA)

2019–2021 Member of the Direction Board of the Brazilian Society of Automatics (SBA)

2019– Class 1D Researcher of the National Council for Scientific and Technological Development - CNPq, Brazil

2016–2019 Class 2 Researcher of the National Council for Scientific and Technological Development - CNPq, Brazil

2015– Member of the IFAC Technical Committee on Robust Control, International Federation of Automatic Control

Research Projects

2023–2024 **Fellowship - Grant 2022/16431-0**

Title Control Design of switched nonlinear systems

Financial Support São Paulo Research Foundation - FAPESP

2018–2020 **Regular Research - Grant 2017/20343-0**

Title Switched control systems: New theoretical perspectives and practical applications

Financial Support São Paulo Research Foundation - FAPESP

2014–2017 **Regular Research - Grant 443166/2014-5**

Title Controle de sistemas dinâmicos com comutação: Aplicação em controle em rede

Financial Support Council for Scientific and Technological Development - CNPq

2013–2015 **Regular Research - Grant 2013/08691-2**

Title Control of switched linear and affine systems

Financial Support São Paulo Research Foundation - FAPESP

Book

J. C. Geromel, G. S. Deaecto, "Análise Linear de Sinais: Teoria, Ensaios Práticos e Exercícios (in portuguese)", Edgard Blucher, 334 pages, 2019

Former Students

[11] Liting He, *Master Degree*, Department of Electrical and Electronic Engineering, Imperial College London, September 2024, Dissertation Title: "Stability analysis of switched nonlinear systems under constrained time-dependent switching rules".

[10] Regiane A. Hirata, *Master Degree*, School of Mechanical Engineering, UNICAMP, July 2023, Dissertation Title: "Limit cycles output feedback stabilization of discrete-time switched affine systems".

[9] Lucas De Cunto Costanzo, *Master Degree*, School of Mechanical Engineering, UNICAMP, July 2022, Dissertation Title: "Control of θ-periodic switched systems with application in electrical engineering".

[8] Julio Alves Mesquita da Silva, *Master Degree*, (co-advisor), School of Mechanical Engineering, UNICAMP, March 2021, Dissertation Title: "Study and application of min-type control strategies in DC-DC power converters".

[7] Helder Richardison Daiha, *PhD Degree*, School of Mechanical Engineering, UNICAMP, July 2020, Dissertation Title: "Control design of switched dynamical systems based on a time-varying Lyapunov function (in portuguese)".

[6] Lucas Neves Egidio, *PhD Degree*, School of Mechanical Engineering, UNICAMP, January 2020, Dissertation Title: "Contributions to Switched Affine Systems Control Theory with Applications in Power Electronics".

[5] Guilherme Kairalla Kolotelo, *Master Degree*, School of Mechanical Engineering, UNICAMP, December 2018, Dissertation Title: "Output feedback control and filter design for continuous-time switched affine systems".

[4] José Lima Luz Netto, *Master Degree*, School of Mechanical Engineering, UNICAMP, April 2018, Dissertation Title: "H2 and Hinf cooperative switched control through communication network: Theory and practical implementation in inverted pendulums (in portuguese)".

[3] Lucas Neves Egidio, *Master Degree*, School of Mechanical Engineering, UNICAMP, September 2016, Dissertation Title: "State feedback control of discrete-time switched affine systems (in portuguese)", supported by Coordination for the Improvement of Higher Education Personnel – CAPES, Ministry of Education, Brazil.

[2] Alan Pereira Suto, *Master Degree*, School of Mechanical Engineering, UNICAMP, May 2015, Dissertation Title: "Stability analisys and $\mathcal{H}_2$ performance optimization of Lur'e type switched systems (in portuguese)", supported by Fundo de Apoio ao Ensino, à Pesquisa e Extensão - FAEPEX/UNICAMP.

[1] Guilherme Cavalari Santos, *Master Degree*, School of Mechanical Engineering, UNICAMP, February 2015, Dissertation Title: "State feedback control of continuous-time switched affine systems (in portuguese)", supported by São Paulo Research Foundation - FAPESP.

Publications in Journals

[45] G. S. Deaecto, A. Astolfi, "Stabilization of a limit cycle for discrete-time switched nonlinear systems", *IEEE Control Systems Letters*, vol. 8, pp. 1253–1258, 2024.

[44] G. S. Deaecto, L. C. Costanzo, L. N. Egidio, "Trajectory tracking for a class of theta-periodic switched systems", *IEEE Transactions on Automatic Control*, vol. 69, pp. 1874–1881, 2024.

[43] G. S. Deaecto, J. C. Geromel, "Comments on Robust $\mathcal{H}_2$ and $\mathcal{H}_\infty$ control for positive continuous-time uncertain linear systems", *Journal of the Franklin Institute*, vol. 361, pp. 1023–1024, 2024.

[42] G. S. Deaecto, L. N. Egidio, L. C. Costanzo, "Trajectory tracking with integral action of periodic switched affine systems", *International Journal of Systems Science*, vol. 55, pp. 1156–1166, 2024.

[41] L. N. Egidio, G. S. Deaecto, R. M. Jungers, "Stabilization of rank-deficient continuous-time switched affine systems", *Automatica*, vol. 143, N. 100426, 2022.

[40] J. A. M. Silva, G. S. Deaecto, T. A. S. Barros, "Analysis and design aspects of min-type switching control strategies for synchronous buck-boost converter"', *Energies*, vol. 15, N. 2302, 2022.

[39] L. N. Egidio, G. S. Deaecto, J. P. Hespanha, J. C. Geromel, "Trajectory tracking for a class of switched nonlinear systems: Application to PMSM". *Nonlinear Analysis: Hybrid Systems*, vol. 44, N. 101164, 2022.

[38] L. N. Egidio, G. S. Deaecto, "Dynamic output feedback control of discrete-time switched affine systems". *IEEE Transactions on Automatic Control*, vol. 66, pp. 4417–4423, 2021.

[37] H. R. Daiha, G. S. Deaecto, "H2 static output feedback switching function design based on a time-varying Lyapunov function approach". *International Journal of Control*, vol. 94, pp. 1484–1491, 2021.

[36] A. M. F. Alvarez, L. N. Egidio, G. S. Deaecto, "Cooperative networked control based on a time-varying Lyapunov function". *Journal of Control, Automation and Electrical Systems*, vol. 32, pp. 533–542, 2021.

[35] L. N. Egidio, H. R. Daiha, G. S. Deaecto, "Global asymptotic stability of limit cycle and $\mathcal{H}_2/\mathcal{H}_\infty$ performance of discrete-time switched affine systems". *Automatica (regular paper)*, vol. 116, number. 108927, 2020.

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[32] G. S. Deaecto, J. C. Geromel, "Stability and performance of discrete-time switched linear systems". *Systems & Control Letters*, vol. 118, pp. 1–7, 2018.

[31] J. C. Geromel and G. S. Deaecto, "Generalized Kleinman-Newton method", *Optimal Control, Applications and Methods*, vol. 39, pp. 1130–1140, 2018.

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[3] J. C. Geromel and G. S. Deaecto, "Switched state feedback control for continuous-time uncertain systems", *Automatica*, vol. 45, pp. 593–597, 2009.

[2] G. S. Deaecto and J. C. Geromel, "Controle de sistemas lineares com comutação", *Controle & Automação*, vol. 19, pp. 431–443, 2008.

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Publications in International Conferences

[32] G. S. Deaecto, R. A. Hirata, M. C. M. Teixeira, "Static output feedback global asymptotic stability of limit cycles for discrete-time switched affine systems", *Proc. of the IFAC World Congress*, pp. 4132-4137, 2023.

[31] G. S. Deaecto, J. C. Geromel, J. L. N. Brito, "Asymptotic stability of continuous-time switched affine systems with unknown equilibrium points", *Proc. of the IEEE Conference on Decision and Control*, pp. 679–684, 2022.

[30] L. N. Egidio, G. S. Deaecto, T.A.S. Barros, "Switched control of a three-phase AC-DC power converter", *Proc. of the IFAC World Congress*, pp. 6471-6476, 2020.

[29] L. N. Egidio, G. S. Deaecto, J. C. Geromel, "Limit cycle global asymptotic stability of continuous-time switched affine systems", *Proc. of the IFAC World Congress*, pp. 6121-6126, 2020.

[28] L. N. Egidio, G. S. Deaecto, J. P. Hespanha, J. C. Geromel, "A nonlinear switched control strategy for permanent magnet synchronous machines", *Proc. of the IEEE Conference on Decision and Control*, pp. 3411-3416, 2019.

[27] H. R. Daiha, G. S. Deaecto, "A time-varying convex Lyapunov function approach for dynamic output feedback $\mathcal{H}_\infty$ control of switched linear systems", *Proc. of the IEEE Conference on Decision and Control*, pp. 581–586, 2019.

[26] G. K. Kolotelo, L. N. Egidio, G. S. Deaecto,, "$\mathcal{H}_2$ and $\mathcal{H}_\infty$ filtering for continuous-time switched affine systems", *Proc. of the IFAC Symposium on Robust Control Design and IFAC Workshop on Linear Parameter Varying Systems*, pp. 295-300, 2018.

[25] G. S. Deaecto, J. C. Geromel, "$\mathcal{H}_2$ state feedback control design of positive switched linear systems", *Proc. of the IFAC World Congress*, pp. 3136–3141, 2017.

[24] J. C. Geromel, G. S. Deaecto, "Generalized Kleinman-Newton method in discrete-time", *Proc. of the IFAC World Congress*, pp. 6891–6896, 2017.

[23] H. R. Daiha, L. N. Egidio, G. S. Deaecto, J. C. Geromel, "$\mathcal{H}_\infty$ state feedback control design of discrete-time switched linear systems", *Proc. of the IEEE Conference on Decision and Control*, pp. 5882–5887, 2017.

[22] L. N. Egidio, H. R. Daiha, G. S. Deaecto, J. C. Geromel, "DC motor speed control via buck-boost converter through a state dependent limited frequency switching rule", *Proc. of the Conference on Decision and Control*, pp. 2072–2077, 2017.

[21] G. S. Deaecto, L. N. Egidio, "Practical stability of discrete-time switched affine systems", *Proc. of the European Control Conference*, pp. 2048–2053, 2016.

[20] G. S. Deaecto, A. P. Suto, "$\mathcal{H}_2$ control design of Lur'e type switched systems", *Proc. of the IFAC Symposium on Robust Control*, pp. 336–341, 2015.

[19] G. S. Deaecto. "Output-input dependent switching function design for switched affine systems with $\mathcal{H}_\infty$ performance", *Proc. of the IEEE Conference on Decision and Control*, pp. 4891–4896, 2015.

[18] T. T. De Sousa, J. C. Geromel, G. S. Deaecto, "Switching control resource allocation in networked control systems", *Proc. of the IEEE Conference on Decision and Control*, pp. 6862–6867, 2015.

[17] G. S. Deaecto, J. C. Geromel, "Switched linear systems control design: A transfer function approach", *Proc. of the IFAC World Congress*, pp. 4068–4073, 2014.

[16] G. S. Deaecto, M. Souza, J. C. Geromel, "State feedback switched control of discrete-time switched linear systems with application to networked control", *Proc. of the Mediterranean Conference on Control and Automation*, pp. 877–883, 2013.

[15] P. Bolzern, G. S. Deaecto, L. Galbusera, "State and output feedback control of switched linear systems with time-varying delay", *Proc. of the IEEE Conference on Decision and Control*, pp. 1578–1583, 2013.

[14] G. S. Deaecto, J. Daafouz, J. C. Geromel, "$\mathcal{H}_2$ performance optimization of singularly perturbed switched linear systems", *Proc. of the IFAC Conference on Analysis and Design of Hybrid Systems*, pp. 228–233, 2012.

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[12] M. Souza, G. S. Deaecto, J. C. Geromel, J. Daafouz, "Self-triggered linear quadratic Networked Control", *Proc. of the Mediterranean Conference on Control & Automation*, pp. 948–947, 2012.

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[10] A. R. Fioravanti,A. P. C. Gonçalves, G. S. Deaecto, J. C. Geromel, "Equivalent LMI constraints: Applications to discrete-time MJLS and switched systems", *Proc. of the IEEE Conference on Decision and Control*, pp. 1313–1318, 2012.

[9] J. C. Geromel, G. S. Deaecto, J. Daafouz, "Suboptimal switching state feedback control consistency analysis for switched linear systems", *Proc. of the IFAC World Congress*, pp. 5849–5854, 2011.

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Publications in National Conferences

[22] G. S. Deaecto, A. Astolfi, "Controle robusto para uma classe de sistemas theta-periódicos com comutação.", *Anais do Congresso Brasileiro de Automática*, pp. 1-6, 2024.

[21] R. A. Hirata, G. S. Deaecto, M. C. M. Teixeira, "Estabilização via realimentação estática de saída de ciclos limites para sistemas afins com comutação a tempo discreto", *Anais do Simpósio Brasileiro de Automação Inteligente*, pp. 1-6, 2023.

[20] J. L. N. Brito, G. S. Deaecto, J. C. Geromel, "Controle robusto de sistemas afins com comutação e pontos de equilíbrio incertos", *Anais do Congresso Brasileiro de Automática*, pp. 2694–2699, 2022.

[19] L. C. Costanzo, G. S. Deaecto, L. N. Egidio, T. A.S.Barros, "Nova metodologia de controle para conversores de potência trifásicos CC-CA", *Anais do Simpósio Brasileiro de Automação Inteligente*, pp. 558-563, 2021.

[18] L. N. Egidio, G. S. Deaecto, "Estabilidade prática de sistemas afins com comutação a tempo discreto e ponto de equilíbrio parcialmente conhecido", *Anais do Simpósio Brasileiro de Automação Inteligente*, pp. 804-809, 2019.

[17] G. K. Kolotelo, L. N. Egidio, G. S. Deaecto, "Projeto de filtros com comutação $\mathcal{H}_2$ e $\mathcal{H}_\infty$ para sistemas afins a tempo contínuo", *Anais do Congresso Brasileiro de Automática*, 2018.

[16] G. K. Kolotelo, G. S. Deaecto, "Controle $\mathcal{H}_2$ e $\mathcal{H}_\infty$ via realimentação de saída de sistemas afins com comutação por ação conjunta de função de comutação e entrada de controle", *Anais do Congresso Brasileiro de Automática*, 2018.

[15] L. N. Egidio, J. L. Luz Netto, G. S. Deaecto, "Controle cooperativo $\mathcal{H}_\infty$ via rede de comunicação", *Anais do Congresso Brasileiro de Automática*, 2018.

[14] H. R. Daiha, G. S. Deaecto, "Projeto de controle $\mathcal{H}_2$ de sistemas lineares com comutação: Uma abordagem baseada em função de Lyapunov variante no tempo", *Anais do Congresso Brasileiro de Automática*, 2018.

[13] J. L. Luz Netto, L. N. Egidio, J. V. Ferreira, G. S. Deaecto, "Controle cooperativo com comutação $\mathcal{H}_2$: Implementação em pêndulos invertidos via rede de comunicação", *Anais do Simpósio Brasileiro de Automação Inteligente*, pp. 171–176, 2017.

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Updated in 10/12/2024 by Grace S. Deaecto