Curriculum Vitæ

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Identity :	Jérémy Rouot , born in France in 1990, single
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Keywords

- **Analysis of discontinuous Hamiltonians systems :** Pontryagin maximum principle.
- **Optimal control computation :** open-loop, optimal synthesis.
- **Numerical methods in optimal control** : direct and indirect methods, global method (semi-algebraic context).
- **Global polynomial optimization :** moments-sos method, semidefinite programming.
- **Algorithms for optimization :** interior points, gradient descent, trust-region, conjugate gradient, augmented Lagrangian.
- **Necessary and sufficient optimality conditions :** theory and practical implementation (variational equation, shooting and homotopy method).
- **Sampled-data control problem :** piecewise constant control on finite partition.
- **Geometric control :** subanalytic geometry, normal form, optimal synthesis.
- **Integrability of Hamiltonian systems :** elliptic functions.
- **Observability :** estimation, closed-loop control (Model Predictive Control).
- **Functional data and optimal transport :** covariance operators, functional principal component analysis, classification algorithm.

Applications. *Magnetic resonance imaging · Swimming problem at low Reynolds · Orbital transfer · Muscular stimulation · Chemical reaction · Speech analysis*

Affiliations

2019– Associate professor at ISEN (Brest), Associate member of MCTAO Team (INRIA), SPOC Team (IMB, Dijon) & Analysis, Stochastic Process and Applications Team (LMBA, Brest).
2017 Associate professor at EPF: École d'Ingénieur-e-s (Troyes).
2016 Postdoc in the Methods and Algorithms for Control Team (LAAS-CNRS, Toulouse).

Diplomas

2016 Ph.D. in Mathematics at INRIA Sophia Antipolis, France.
2013 Ingénieur ENSIMAG, Grenoble Institute of Technology, France.

Research Projects

2020– Co-supervision of the Phd thesis of M. Sayari in Functional data and Optimal transport
2019 Member of PGMO project on Control and Muscular stimulation
2018 Member of a PEPS project (labex AMIES) on Control and Muscular stimulation
2017 Member of PGMO project on Algebraic and geometric methods applied to optimal control
2017 Member of ERC-TAMING on Taming nonconvexity in optimization: http://taming.laas.fr/

Collective responsibilities

2020– In charge of the graduate program Big Data of the Isen engineering school.
2018 In charge of an international school at EPF: École d'Ingénieur-e-s for students from Amity university (India).
2018 In charge of a collobaration between EPF: École d'Ingénieur-e-s and Aalto University (Finland) to develop mathematical exercises using the Stack Moodle plugin.
2017 In charge of the entrance mathematical exam for students of EPF: École d'Ingénieur-e-s .
2016– Referee for *International Journal of Control, Networks and Heterogeneous Media, Acta Applicandae Mathematicae* and conference proceedings *Conference on Decision and Control, International Federation of Automatic Control.*
2015 Organiser of a weekly seminar for the Carnot-Pasteur doctoral school, Dijon.

Publications

Preprints of the referenced articles are available from my personal webpage.

Book

1. B. Bonnard, M. Chyba, J. Rouot, *Geometric and Numerical Optimal Control with Application to Swimming at Low Reynolds Number and Medical Resonance Imaging*, Springer International Publishing, XIV-108, SpringerBriefs in Mathematics (2018).

International journal articles

2. B. Bonnard, J. Rouot. *Geometric optimal techniques to control the muscular force response to functional electrical stimulation using a non-isometric force-fatigue model*, J. Geom. Mech., American Institute of Mathematical Sciences (AIMS), **48** (2020), pp.178–192.
3. T. Bakir, B. Bonnard, L. Bourdin, J. Rouot. *Direct and Indirect Methods to Optimize the Muscular Force Response to a Pulse Train of Electrical Stimulation*, accepté dans ESAIM: Proceedings and Surveys, EDP Sciences (2020), 12 pages.
4. T. Bakir, B. Bonnard, L. Bourdin, J. Rouot. *Pontryagin-Type Conditions for Optimal Muscular Force Response to Functional Electric Stimulations*, J. Optim. Theory Appl., **184** 2, (2020), pp.581–602.
5. B. Bonnard, O. Cots, J. Rouot, T. Verron. *Time minimal saturation of a pair of spins and application in magnetic resonance imaging*, Math. Control Relat. Fields, **10** 1, (2020), pp.47–88.
6. T. Bakir, B. Bonnard, J. Rouot. *Geometric Optimal Control Techniques to Optimize the Production of Chemical Reactors using Temperature Control*, Annu. Rev. Control, Elsevier, **48** (2019), pp.178–192.
7. T. Bakir, B. Bonnard, J. Rouot. *A case study of optimal input-output system with sampled-data control: Ding et al. force and fatigue muscular control model*, Networks and Heterogeneous Media, AIMS-American Institute of Mathematical Sciences, **14** 1 (2019) pp.79–100.
8. P. Bettiol, B. Bonnard, A. Nolot, J. Rouot. *Sub-Riemannian geometry and swimming at low Reynolds number: the Copepod case*, ESAIM: COCV, EDP Sciences, **25** 9 (2019), 30 pages.
9. B. Bonnard, M. Chyba, J. Rouot, D. Takagi. *Sub-Riemannian geometry, Hamiltonian dynamics, micro-swimmers, Copepod nauplii and Copepod robot*, Pac. J. Math. Ind. **10** 2 (2018), 42 pages.
10. P. Bettiol, B. Bonnard, J. Rouot. *Optimal strokes at low Reynolds number: a geometric and numerical study of Copepod and Purcell swimmers.* SIAM J. Control Optim., **56** 3, (2018) pp. 1794–1822.
11. P. Bettiol, B. Bonnard, L. Giraldi, P. Martinon, J. Rouot. *The three links Purcell swimmer and some geometric problems related to periodic optimal controls.* Variational methods in Imaging and geometric control, Radon Series on Computational and Applied Math, **18**, de Gruyter (2017), 27 pages.

Book sections

12. B. Bonnard, J. Rouot. *Towards Geometric Time Minimal Control without Legendre Condition and with Multiple Singular Extremals for Chemical Networks, accepté dans AIMS on Applied Mathematics* (2020), 34 pages.
13. B. Bonnard, H. Henninger, J. Rouot. *Lunar perturbation of the metric associated to the averaged orbital transfer.* Analysis and geometry in control theory and its applications, conférence en juin 2014, actes publiés dans Springer InDam series, **11** (2015), 18 pages.

Conference (Refereed) Proceedings

14. O. Assainova, J. Rouot, E. Sedgh-Gooya. *Taming the curse of dimensionality for perturbed token identification*, 10th International Conference on Image Processing Theory, Tools and Applications, Nov. 2020, Paris, France.
15. T. Bakir, B. Bonnard, J. Rouot. *Connection between singular arcs in optimal control using bridges. Physical occurence and Mathematical model.* In Proceedings of the 58th Conference on Decision and Control (2019), 6 pages.
16. J.-B. Caillau, L. Dell'Elce, J.-B. Pomet, J. Rouot. *Optimal control of slow-fast mechanical systems.* Proceedings of the Complex Systems Academy of Excellence, Nice (2018) pp.105–116.
17. J.-B. Lasserre, J. Rouot. *On inverse optimal control via polynomial optimization.* In Proceedings of the 56th IEEE Conférence on Decision and Control, (2017) pp.721–726.
18. P. Bettiol, B. Bonnard, A. Nolot, J. Rouot. *Optimal control theory and the efficiency of the swimming mechanism of the Copepod Zooplankton.* In Proceedings of the 20th IFAC World Congress, Toulouse (2017), 6 pages.
19. B. Bonnard, M. Chyba, J. Rouot, D. Takagi. *A Numerical Approach to the Optimal Control and Efficiency of the Copepod Swimmer.* In Proceedings of the 55th "IEEE Conférence on Decision and Control", Las Vegas (2016), 6 pages.
20. B. Bonnard, A. Jacquemard, J. Rouot. *Optimal Control of an Ensemble of Bloch Equations with Applications in MRI.* In Proceedings of the 55th "IEEE Conférence on Decision and Control", Las Vegas (2016), 6 pages.

Submitted Articles

21. Finite Dimensional Approximation to Muscular Response in Force-Fatigue Dynamics using Functional Electrical Stimulation, submitted 2021, 19 pages (avec T. Bakir, B. Bonnard, S. Gayrard).
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