

Thibault Liard

Curriculum Vitae

General Information

- Associate professor (Maître de conférences) at University of Limoges, XLIM, MOD team.
- Habilitation à diriger des recherches (HDR), entitled Monitoring and Management of Traffic Flow, obtained on March 19, 2026.
- Email: Thibault.liard@unilim.fr

Education

Keywords: Partial differential equations, nonlinear hyperbolic systems, coupled PDE-ODE, numerical methods (wave-front tracking, Godunov scheme), inverse problems, control theory, stabilization under uncertainty, optimization problems, machine learning techniques.

2021– : Associate professor at XLIM laboratory, University of Limoges, team MOD.

2020-2021 : Postdoctoral researcher in Applied Mathematics at LS2N (France), stabilization under uncertainty for conservation laws, under the supervision of Swann Marx.

2019-2020 : Associate researcher in Applied Mathematics at the University of Deusto, Bilbao (Spain), inverse problems and numerical methods for conservation laws, under the supervision of Enrique Zuazua.

2018-2019 : Postdoctoral researcher in Applied Mathematics at Inria Grenoble Rhône-Alpes (France), control of macroscopic traffic flow models, under the supervision of Maria Laura Delle Monache.

2017 : Postdoctoral researcher in Applied Mathematics at Rutgers University-Camden (USA), control of macroscopic traffic flow models, under the supervision of Benedetto Piccoli.

2013–2016 : PhD student in Applied Mathematics at the Jacques-Louis Lions Laboratory (Sorbonne University, France), observation and control for some conservative systems, under the supervision of Alain Haraux and Yannick Privat.

2011–2012 : Agrégation de Mathématiques (Teaching qualification).

2010-2013 : Master's degree in Applied Mathematics, Magistère at École Normale Supérieure de Rennes (France).

Research Articles

Submitted papers in 2026

1. Strongly coupled second-order hyperbolic ODE-PDE systems with moving flux constraints: analysis and existence of solutions; A. Hayat, T. Liard, B. Piccoli, submitted (2026).
2. Imaging the building blocks of ant pheromone communication; L.A. Poissonnier, E. Amichot, J. Brevier, T. Liard, P. Bon, submitted (2026).

Journal Articles

1. A PDE-ODE model for traffic control with autonomous vehicles; T. Liard, R. Stern and M.L Delle Monache, *Networks and Heterogeneous Media* 2023, Volume 18, Issue 3: 1190-1206 (2023).
2. Analysis and numerical solvability of backward-forward conservation laws; T. Liard and E. Zuazua, *SIAM Journal on Mathematical Analysis*, Vol. 55, No. 4. pp. 1949-1968, doi:10.1137/22M147872 (2023).
3. Super-twisting sliding mode control for the stabilization of a linear hyperbolic system; I. Balogoun, S. Marx, T. Liard, F. Plestan, *IEEE Control Systems Letters*, vol. 7, pp. 1-6, doi: 10.1109/LCSYS.2022.3186230 (2023).
4. Boundary sliding mode control of a system of linear hyperbolic equations: a Lyapunov approach; T. Liard, I. Balogoun, S. Marx, F. Plestan, *Automatica*, Volume 135, 109964 (2022).
5. Initial data identification for the one-dimensional Burgers equation; T. Liard and E. Zuazua, *IEEE Transactions on Automatic Control*, doi: 10.1109/TAC.2021.309621 (2021).
6. On entropic solutions to conservation laws coupled with moving bottlenecks; T. Liard and B. Piccoli, *Communications in Mathematical Sciences*, Vol. 19, No. 4. pp. 919-945 (2021).
7. A controlled multiscale model for traffic regulation via autonomous vehicles; M. Garavello, P. Goatin, T. Liard and B. Piccoli, *J. Differential Equations*, <https://doi.org/10.1016/j.jde.2020.04.031> (2020).
8. Traffic reconstruction using autonomous vehicles; M.L. Delle Monache, T. Liard, B. Piccoli, R. Stern, D. Work. *SIAM Journal on Applied Mathematics*, Vol. 79, No. 5. pp. 1748-1767 (2019).
9. Well-posedness for scalar conservation laws with moving flux constraints; T. Liard and B. Piccoli, *SIAM Journal on Applied Mathematics*. No. 2. pp 641–667 (2019).
10. Non-localization of eigenfunctions for Sturm-Liouville operators; T. Liard, P. Lissy and Y. Privat, *J. Differential Equations* 264, no. 4, 2449–2494 (2018).
11. A Kalman rank condition for the indirect controllability of coupled systems of linear operator groups; T. Liard and P. Lissy, *P. Math. Control Signals Syst.* 29: 9. <https://doi.org/10.1007/s00498-017-0193-x> (2017).
12. How to estimate observability constants of one-dimensional wave equations? Propagation versus Spectral methods; A. Haraux, T. Liard and Y. Privat, *J. Evol. Eq.* 16, 825–856 (2016).

Conference Proceedings

1. Traffic Flow Reconstruction from Limited Collected Data; N. Baloul, A. Hayat, T. Liard and P. Lissy, 2025 IEEE 64th Conference on Decision and Control (CDC), pp. 7981-7986 (2025).
2. Optimal driving strategies for traffic control with autonomous vehicles; T. Liard, R. Stern and M.L Delle Monache. *IFAC World Congress*, Berlin, Germany, *IFAC-PapersOnLine*, 53(2), 5322-5329 (2020).
3. The Riemann Problem for the GARZ Model with a moving constraint; T. Liard, F. Marcellini, B. Piccoli. *XVII International Conference (HYP2018) on Hyperbolic Problem*, vol 10, pages 524-530 (2018).

Book Chapters

1. Feedback Control Algorithms for the Dissipation of Traffic Waves with Autonomous Vehicles; M.L. Delle Monache et al. *Computational Intelligence and Optimization Methods for Control Engineering*. Springer Optimization and Its Applications, vol 150. Springer, Cham (2019).

Funding and Supervision

○ Funding

- Modeling the Impact of Individual and Collective Cognition on Ant Foraging, University of Limoges Exploratory Call for Projects, 12500 euros,
- Connecting Deep learning with Dynamic models for Traffic flow Management, ANR JCJC 2024-2028, 242,247 euros.
- Diffusion models for polynomial system solving, University of Limoges AOI 2025, 4500 euros.
- COordination des Réseaux de Trafic à grande Échelle (CORTEX), Sci-ty 2026-2028, 50,000 euros; The CORTEX software prototype is currently being registered with the APP (French Software Protection Agency).

○ Supervision

- **PhD student:** Nail Baloul, since October 2024 (45% co-supervision, with Amaury Hayat and Pierre Lissy).
- **Postdoctoral researchers:**
 - Laure Anne Poissonnier, from June 2025 to August 2026.
 - Kala Agbo, from October 2025 to September 2026.
- **Internships and Master's students:**
 - Shun Arakawa, 2025-2026, 6 months, co-advised with Olivier Ruatta and Tristan Vaccon.
 - Kein Ebindja, 2025, 3 months.
 - Alexandre Paulin, 2024, 2 months, co-advised with Francisco Silva.
 - Anais Rat, 2017, 2 months, co-advised with Benedetto Piccoli.

Academic Service and Teaching

Administrative Responsibilities: coordinator for Master 2 internships, organizer of the MOD team seminar, communication coordinator for the MATHIS research axis, member of the Master 1 examination board.

Academic Responsibilities: reviewer for Acta Applicandae Mathematicae; Automatica; European Journal of Control; IEEE Transactions on Automatic Control; IEEE Control Systems Letters; IEEE Transactions on Control Systems Technology; Journal of Differential Equations; Mathematical Biosciences and Engineering; Transportation Research Part B; 15th IFAC Symposium on Control in Transportation Systems; 2018 American Control Conference; Mathematical Control and Related Fields; Journal of Mathematical Analysis and Applications.

Teaching : Approximately 250–300 hours of teaching per year at undergraduate and Master's levels. Courses taught include: Fundamentals of Mathematics; Mathematics Reinforcement; Introduction to Machine Learning; Linear and Quadratic Optimization; Convex Analysis; Splitting Methods for Convex Analysis; Numerical Analysis.