

GUILLAUME COSTESEQUE

CONTACT INFORMATION Inria Sophia-Antipolis Méditerranée Work: +33(0)49-238-7625
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RESEARCH INTERESTS Traffic flow modeling, numerical analysis, conservation laws, hyperbolic systems, Hamilton-Jacobi equation, calculus of variations, data assimilation

EDUCATION **Université Paris-Est, Ecole des Ponts ParisTech** Marne-la-Vallée, France

Ph.D., Applied Mathematics, Sept. 2014

- Thesis Topic: *Traffic flow modeling on networks using Hamilton-Jacobi equations*
- Advisors: Régis Monneau, Ph.D and Jean-Patrick Lebacque, Ph.D
- Committee in charge:
 - Paola Goatin, Inria Sophia Antipolis Méditerranée, France
 - Jean-Patrick Lebacque, Université Paris-Est, France
 - Ludovic Leclercq, Université de Lyon, France
 - Saïd Mammar, Université Evry Val d'Essonne, France
 - Régis Monneau, Université Paris-Est, France
 - Markos Papageorgiou, TU Crete, Greece
 - Chris M.J. Tampère, KU Leuven, Belgium

Institut National des Sciences Appliquées de Lyon (INSA), Lyon, France

M.S., Civil Engineering, Sept. 2011

- Topic: *Traffic flow modeling: micro to macro approaches*
- Advisors: Régis Monneau, Ph.D and Jean-Patrick Lebacque, Ph.D

Ecole Nationale des Travaux Publics de l'Etat (ENTPE), Vaulx-en-Velin, France

Engineer's Degree, Transportation management (Major), June 2011

- Graduated as Civil Servant, *corps des Travaux Publics de l'Etat* (ITPE)

RESEARCH EXPERIENCE **Post-doctoral Researcher** Sept. 2014 to present
Project-team ACUMES (formerly OPALE)
Inria Sophia Antipolis Méditerranée, France
Leader: Paola Goatin, Ph.D

Visiting Scholar Feb. 2017 (1 week)
Scientific Computing Research Group (SCICOM)
Universität Mannheim, Germany
Leader: Simone Göttlich, Ph.D

Visiting Scholar Dec. 2014 (2 weeks) & May 2015 (2 weeks) & Oct. 2015 (1 week)
EE and CS Departments & Institute of Transportation Studies
U.C. Berkeley, California
Leader: Alexandre Bayen, Ph.D

Graduate Researcher Oct. 2011 to Sept. 2014
Center of Research in Mathematics and Scientific Computing (CERMICS)
Ecole des Ponts ParisTech, France
Supervisors: Régis Monneau, Ph.D and Jean-Patrick Lebacque, Ph.D

Research Assistant

March to July 2010

Regional Bridges and Roads Laboratory (LRPC) of Lyon, France

European study on increasing maximum truck weight and impact on infrastructures

Supervisors: Véronique Cérézo, Ph.D and Mohamed Bouteldja, Ph.D

PUBLICATIONS

Refereed international journal papers

1. **Costeseque, G.**, Lebacque, J.P., Monneau, R., “A convergent scheme for Hamilton-Jacobi equations on a junction: application to traffic”, *Numerische Mathematik*, 3: 405–447, 2014.
2. **Costeseque, G.**, Lebacque, J.P., “Discussion about traffic junction modelling: conservation laws VS Hamilton-Jacobi equations”, *Discrete Cont. Dyn. Syst. S*, 7: 411–433, 2014.
3. **Costeseque, G.**, Lebacque, J.P., “A variational formulation for higher order macroscopic traffic flow models: numerical investigation”, *Transp. Research part B*, 70: 112–133, 2014.
4. Laval, J.A., **Costeseque, G.**, Chilukuri, B.R., “The impact of source terms in the variational representation of traffic flow”, *Transp. Research part B*, 94: 204–216, 2017.
5. Tordeux, A., **Costeseque, G.**, Herty, M., Seyfried, A., “From traffic and pedestrian follow-the-leader models with reaction time to first order convection-diffusion flow models”, *SIAM Journal on Applied Mathematics*, 78: 63–79, 2018.

Peer-reviewed international conference proceedings

6. **Costeseque, G.**, Lebacque, J.P., “Intersection modeling using a convergent scheme based on Hamilton-Jacobi equation”, Proceedings of 15th EWGT, *Social & Behavioral Sciences*, 54: 736–748, 2012.
7. **Costeseque, G.**, Lebacque, J.P., “Multi-anticipative car-following behaviour: new empirical investigations”, Proceedings of the TGF’13 conference, Jülich, Germany, 2014.
8. **Costeseque, G.**, Lebacque, J.P., Khelifi, A., “Lagrangian GSOM traffic flow models on junctions”, Proceedings of the 8th Vienna International Conference on Mathematical Modelling, Vienna, Austria, 2015.
9. **Costeseque, G.**, Duret, A., “Mesoscopic multiclass traffic flow modeling on multi-lane sections”, 95th Transportation Research Board Annual Meeting (TRB), 11-17 January, Washington, (USA) [CDROM]. Washington: Transportation Research Board, 2016.
10. Laurent-Brouty, N., **Costeseque, G.**, Goatin, P., “A coupled PDE–ODE model for bounded acceleration in macroscopic traffic flow models”, accepted at 15th IFAC Symposium on Control in Transportation Systems (CTS 2018), Savona, Italy, 2018.

Book chapters

11. **Costeseque, G.**, “Modélisation et simulation dans le contexte du trafic routier”, In F. Varenne et M. Silberstein Eds, *Modéliser & simuler. Epistémologies et pratiques de la modélisation et de la simulation*, Editions Matériologiques, 2013.
12. **Costeseque, G.**, “A Panorama on Macroscopic Hamiltonian Models”, In J.P. Aubin et A. Désilles, *Traffic Networks as Information Systems: A viability Approach*, Springer, 2016.

Papers submitted

13. Kolb, O., Costeseque, G., Goatin, G., Göttlich, S. (2018). Pareto-optimal coupling conditions for the Aw-Rascle-Zhang traffic flow model at junctions, *submitted to SIAM Journal on Applied Mathematics*.

Papers in preparation

14. **Costeseque, G.**, Lebacque, J.P., “A representation formula for traffic flow models on networks”, *in preparation*.
15. **Costeseque, G.**, Lebacque, J.P., Khelifi, A., “Higher order macroscopic traffic flow models on networks: a Lagrangian perspective”, *in preparation*.
16. **Costeseque, G.**, Goatin, P., Rossi, F., “Homogenization of multi-anticipative car-following models: towards the LWR macroscopic traffic flow model”, *in preparation*.
17. Canepa, E.S., **Costeseque, G.**, Claudel, C.G., “A queue estimation method aware of bounded acceleration: application to arterials”, *in preparation*.
18. **Costeseque, G.**, Goatin, P., Göttlich, S., Kolb, O., “Coupling conditions and on-ramp models for a second order traffic network model”, *in preparation*.
19. Duret, A., **Costeseque, G.**, “Multiclass LS-LWR model : Solutions and applications”, *in preparation*.
20. **Costeseque, G.**, Ghorbel, A., “A numerical study for the homogenization of traffic flow models on a network”, *in preparation*.

Thesis

21. **Costeseque, G.**, “Modélisation du trafic routier : passage du microscopique au macroscopique” , Master Thesis, MEGA Doctoral School, Université Lyon–ENTPE, 2011.
22. **Costeseque, G.**, “Contribution to road traffic flow modeling on networks thanks to Hamilton-Jacobi equations”, Ph.D. Thesis, MSTIC Doctoral School, Université ParisEst, 2014.

CONFERENCE, WORKSHOP OR SEMINAR TALKS

1. Contributed speaker at EURO Working Group on Transportation (EWGT) Conference, Ecole des Ponts ParisTech, Marne-la-Vallée, September 2012.
2. Invited speaker in the working group seminar “Mathématiques pour la modélisation des transports” hold by M. Roussignol (UPEM), Université Paris-Est, Marne-la-Vallée, November 29, 2012.
3. Contributed speaker at Workshop TRAM2, INRIA Sophia-Antipolis, March 20, 2013.
4. Contributed speaker at ANR HJnet meeting, INSA Rennes, June 14, 2013.
5. Contributed speaker in the Traffic and Granular Flow (TGF)’13, Jülich, Germany, September 25-27, 2013.
6. Invited speaker in the seminar “Modélisation des Réseaux de Transports IFSTTAR”, Marne-la-Vallée, October 16, 2013.
7. Invited speaker in the seminar “Transport et propagation de “monades” dans un réseau dynamique” hold by J.P. Aubin, Institut Henri Poincaré, Paris, June 3, 2014.
8. Contributed speaker in the CERMICS PhD students seminar, Ecole des Ponts ParisTech, Marne-la-Vallée, June 6, 2014.

9. Invited speaker at NETCO Conference, Tours, France, June 24, 2014.
10. Invited speaker in Bayen's group meeting, UC Berkeley, December 1st, 2014.
11. Introduction à la modélisation dynamique du trafic , Journée thématique Intelligent Transport Systems, Campus SophiaTech - EURECOM, March 20, 2015.
12. ORESTE Associated Team presentation at Inria-Industry Meeting (RII) on Smarter Cities, San Francisco, May 11, 2015.
13. Invited speaker in mini-symposium on Set-valued Approaches to Control Problems with Applications in Traffic Flow Modeling, at SIAM Conference on Control and its Applications (CT15), Paris, July 8-10, 2015.
14. Invited speaker at the workshop on Mathematical Foundations of Traffic (TRAWS1), IPAM Los Angeles, Sept. 28- Oct. 2, 2015.
15. Invited speaker at the Institute of Transportation Studies (ITS) seminar, Berkeley, October 9, 2015.
16. Contributed speaker in the TRAM3 Terminus meeting, Inria Sophia-Antipolis Méditerranée, Valbonne, January 7, 2016.
17. Contributed speaker (work with Aurélien Duret) in the TRB Annual Meeting 2016, Washington Convention Center, Washington DC, January 12, 2016.
18. Contributed speaker (work with Jorge A. Laval) in the TRB Annual Meeting 2016, Washington Convention Center, Washington DC, January 12, 2016.
19. Invited speaker in the seminar "Modélisation des Réseaux de Transports IFSTTAR", Marne-la-Vallée, May 12, 2016.
20. Organizer and contributed speaker at mini-symposium "HJtraffic2016: Homogenization of PDEs and application to road traffic", Institut Henry Poincaré Paris, September 28, 2016.
21. Invited speaker in the Numerical analysis & PDEs team seminar, Laboratoire J.A. Dieudonné, Université Nice Sophia-Antipolis, Nice, January 12, 2017.
22. Invited speaker in Simone Göttlich's team seminar, Scientific Computing Research Group (SCICOM), Universität Mannheim, Germany, February 21, 2017.
23. Contributed speaker at the VIII Workshop on the Mathematical Foundations of Traffic, Transport Modeling and Management: Vehicles and Crowds, INdAM Università La Sapienza Roma, March 08, 2017.
24. Invited speaker at Faculté des Sciences de Sfax, Sfax, Tunisia, May 4, 2017.
25. Invited speaker at the international conference on Finite volumes schemes and Traffic modeling, Laboratoire de Mathématiques de Besançon, Université de Franche-Comté, Besançon, November 22, 2017

AWARDS AND
FELLOWSHIP

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|---|-----------------------------------|
| <p>Secondment Position</p> <ul style="list-style-type: none"> • French National Institute for Research in Computer Science and Control (Inria)
Competitively attributed, less than 10 recipients
Renewed in 2016 <p>SMAI "BOUM" Fellowship</p> <ul style="list-style-type: none"> • French Society for Applied and Industrial Mathematics
Dedicated to PhD students and/or young researchers to foster collaborations | <p>2014–2018</p> <p>2015–2016</p> |
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Doctoral Fellowship 2011–2014
• French Ministry of Transports and Sustainable Development (MEDDE)
Competitively attributed, less than 10 recipients

Academic Awards
• French abertis Award for Transport Infrastructure Management Apr. 2012
• International Abertis Prize for Research Oct. 2012

PROFESSIONAL SKILLS
Operation systems: Windows, Linux (Debian, Ubuntu), MacOS
Software: MicroSoft Office, L^AT_EX and others
Computer Programming: MATLAB, Maple, Python (beginner)
Languages: professional abilities in English, strong comprehension of Spanish

REFERENCES
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Institut Français des Sciences et Technologies des Transports, de l'Aménagement et
des Réseaux

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Ingénieur en Chef du Corps des Ponts, Eaux et Forêts,
Professor in Applied Mathematics Phone: +33 (0)1 64 15 35 80
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