

CURRICULUM VITAE

Jean-Philippe Lessard

Employment

- Professor, Department of Mathematics and Statistics, McGill University, Canada. 2022 - Present.
- Associate Professor, Dep. of Mathematics and Statistics, McGill University, Canada. 2017 - 2022.
- Associate Professor, Dep. of Mathematics and Statistics, Université Laval, Canada. 2015 - 2017.
- Assistant Professor, Dep. of Mathematics and Statistics, Université Laval, Canada. 2011 - 2015.
- Group leader of the research line *Computational Mathematics* at the Basque Center for Applied Mathematics (BCAM), Bilbao, Spain, 07/2010 - 07/2011.
- NSF Mathematical Sciences Institutes Postdoctoral Fellowship. Institute for Advanced Study (IAS), Princeton, 09/2009 - 08/2010.
- Postdoctoral Associate, Rutgers University, 01/2008–05/2008 and 01/2009–08/2009.
- Postdoctoral Researcher, Vrije Universiteit Amsterdam, 09/2007–12/2007 and 06/2008–12/2008.

Education

Ph.D. Mathematics, Georgia Institute of Technology, 2007.

DISSERTATION: *Validated Continuation for Infinite Dimensional Problems*.

Advisor: Konstantin Mischaikow.

M.Sc. Mathematics, Université de Montréal, 2002.

DISSERTATION: *Bifurcation et Chaos dans le Système de Lorenz*.

Advisor: Christiane Rousseau.

B.Sc. Mathematics, Université de Sherbrooke, 2000.

Publications

Preprints

[82] K. CONSTANTINEAU, C. GARCÍA-AZPEITIA AND J.-P. LESSARD. Platonic constellations of periodic motions in the $(n + 1)$ - body problem. Preprint, 2026. ([arXiv:2609.10242](#)).

[81] D. BLANCO AND J.-P. LESSARD. Rigorous Validation of Cusp Bifurcations of Stationary Periodic Patterns in Partial Differential Equations. Preprint, 2026. ([arXiv:2608.15613](#)).

Accepted

- [80] K. CHURCH, K. CONSTANTINEAU AND J.-P. LESSARD. Spatially inhomogeneous two-cycles in an integrodifference equation. To appear in *SIAM Journal on Applied Dynamical Systems*, 2026 ([arXiv:2510.21134](#)).
- [79] J.B. VAN DEN BERG, G. DUCHESNE AND J.-P. LESSARD. From heteroclinic loops to homoclinic snaking in reversible systems: rigorous forcing through computer-assisted proofs. To appear in *SIAM Journal on Applied Dynamical Systems*, 2026 ([arXiv:2507.16798](#)).
- [78] R. CALLEJA, C. GARCÍA-AZPEITIA, O. HÉNOT, J.-P. LESSARD AND J.D. MIRELES JAMES. From the Lagrange Triangle to the Figure Eight Choreography: Proof of Marchal's Conjecture. To appear in the *Transactions of the American Mathematical Society*, 2026. ([arXiv:2406.17564](#)).

Published

- [77] M. CADIOT AND J.-P. LESSARD. Recent advances about the rigorous integration of parabolic PDEs via fully spectral Fourier-Chebyshev expansions. *Numerische Mathematik*, 158(4): 1237–1289, 2026.
- [76] M. AYALA, C. GARCÍA-AZPEITIA AND J.-P. LESSARD. Computer-Assisted Proofs of Solitons in Bose-Einstein Condensates. *Journal of Nonlinear Science*, 36(2), Paper No. 28, 2026.
- [75] L. VAN DER AALST, J.B. VAN DEN BERG AND J.-P. LESSARD. Periodic localized traveling waves in the two-dimensional suspension bridge equation. *Nonlinearity*, 38(7), Paper No. 075029, 2025.
- [74] M. CADIOT, J. JAQUETTE, J.-P. LESSARD AND A. TAKAYASU. Validated matrix multiplication transform for orthogonal polynomials with applications to computer-assisted proofs for PDEs. *Communications in Nonlinear Science and Numerical Simulation*, Volume 151, Paper No. 109063, 2025.
- [73] J.-P. LESSARD AND A. PUGLIESE. Cusp bifurcations: numerical detection via two-parameter continuation and computer-assisted proofs of existence. *Discrete and Continuous Dynamical Systems - Series B*, 30(6): 2135–2158, 2025.
- [72] K. CONSTANTINEAU, C. GARCÍA-AZPEITIA, L.C. GARCÍA-NARANJO AND J.-P. LESSARD. Determination of stable branches of relative equilibria of the N -vortex problem on the sphere. *Communications in Mathematical Physics*, 406(2), 47 pages, 2025.
- [71] G. DUCHESNE, J.-P. LESSARD AND A. TAKAYASU. A rigorous integrator and global existence for higher-dimensional semilinear parabolic PDEs via semigroup theory. *Journal of Scientific Computing*, 102(3), Paper No. 62, 66 pages, 2025.
- [70] M. CADIOT, J.-P. LESSARD AND J.-C. NAVE. Stationary non-radial localized patterns in the planar Swift-Hohenberg PDE: constructive proofs of existence. *Journal of Differential Equations*, Volume 414, 555–608, 2025.
- [69] M. CADIOT, J.-P. LESSARD AND J.-C. NAVE. Rigorous computation of solutions of semilinear PDEs on unbounded domains via spectral methods. *SIAM Journal on Applied Dynamical Systems*, 23(3): 1966–2017, 2024.
- [68] J.B. VAN DEN BERG, M. GAMEIRO, J.-P. LESSARD AND R.C. VANDERVORST. Towards computational Morse-Floer homology: forcing results for connecting orbits by computing relative indices of critical points. *Foundations of Computational Mathematics*, 24(5): 1739–1776, 2024.

- [67] O. HÉNOT, J.-P. LESSARD AND J.D. MIRELES JAMES. Numerical computation of transverse homoclinic orbits for periodic solutions of delay differential equations. *SIAM Journal on Applied Dynamical Systems*, 22(4): 3093–3129, 2023.
- [66] J.B. VAN DEN BERG, O. HÉNOT AND J.-P. LESSARD. Constructive proofs for localized radial solutions of semilinear elliptic systems on $\mathbb{R}^d$. *Nonlinearity*, 36(12): 6476–6512, 2023.
- [65] J. CYRANKA, K. CHURCH AND J.-P. LESSARD. Worrisome properties of neural network controllers and their symbolic representations. *Proceedings of the 2023 European Conference on Artificial Intelligence (ECAI 2023)*, Volume 372, pages 517–525, 2023.
- [64] J. GIMENO, J.-P. LESSARD, J.D. MIRELES JAMES AND J. YANG. Persistence of periodic orbits under state-dependent delayed perturbations: computer-assisted proofs. *SIAM Journal on Applied Dynamical Systems*, 22(3): 1743–1779, 2023.
- [63] J.-P. LESSARD, K. MATSUE AND A. TAKAYASU. Saddle-type blow-up solutions with computer-assisted proofs: validation and extraction of global nature. *Journal of Nonlinear Science*, 33(1), Paper No. 46, 2023.
- [62] K. CHURCH, O. HÉNOT, P. LAPPICY, J.-P. LESSARD AND H. SPRINK. Periodic orbits in Hořava-Lifshitz cosmologies. *General Relativity and Gravitation*, 55(1), Paper No. 2, 2023.
- [61] A. TAKAYASU, J.-P. LESSARD, J. JAQUETTE AND H. OKAMOTO. Rigorous numerics for nonlinear heat equations in the complex plane of time. *Numerische Mathematik*, 151(3), 693–750, 2022.
- [60] J.B. VAN DEN BERG, G. DUCHESNE AND J.-P. LESSARD. Rotation invariant patterns for a nonlinear Laplace-Beltrami equation: a Taylor-Chebyshev series approach. *Journal of Computational Dynamics*, 9(2): 253–278, 2022.
- [59] J. JAQUETTE, J.-P. LESSARD AND A. TAKAYASU. Global dynamics in nonconservative nonlinear Schrödinger equations. *Advances in Mathematics*, Volume 398, Paper 108234, 2022.
- [58] G. MARTINE LA BOISSONNIÈRE, R. CHOKSI AND J.-P. LESSARD. Microscopic patterns in the 2D phase-field-crystal model. *Nonlinearity*, 35(3), 1500–1520, 2022.
- [57] J. CYRANKA AND J.-P. LESSARD. Validated forward integration scheme for parabolic PDEs via Chebyshev series. *Communications in Nonlinear Science and Numerical Simulation*, Volume 109, Paper No. 106304, 2022.
- [56] J. JAQUETTE, J.-P. LESSARD AND A. TAKAYASU. Singularities and heteroclinic connections in complex-valued evolutionary equations with a quadratic nonlinearity. *Communications in Nonlinear Science and Numerical Simulation*, Volume 107, Paper No. 106188, 2022.
- [55] K. CHURCH AND J.-P. LESSARD. Rigorous verification of Hopf bifurcations in functional differential equations. *Physica D*, Volume 429, Paper No. 133072, 2022.
- [54] K. CONSTANTINEAU, C. GARCÍA-AZPEITIA AND J.-P. LESSARD. Spatial relative equilibria and periodic orbit of the Coulomb $(n+1)$ body problem. *Qualitative Theory of Dynamical Systems*, 21(3): 1–19, 2022.
- [53] O. HÉNOT, J.-P. LESSARD AND J.D. MIRELES JAMES. Parameterization of unstable manifolds for DDEs: formal series solutions and validated error bounds. *Journal of Dynamics and Differential Equations*, 34(2): 1285–1324, 2022.

- [52] J.B. VAN DEN BERG, C. GROOTHEDDE AND J.-P. LESSARD. A general method for computer-assisted proofs of periodic solutions in delay differential problems. *Journal of Dynamics and Differential Equations*, 34(2):853–896, 2022.
- [51] J.B. VAN DEN BERG, J.-P. LESSARD AND E. QUEIROLO. Rigorous verification of Hopf bifurcations via desingularization and continuation. *SIAM Journal on Applied Dynamical Systems*, 20(2):573–607, 2021.
- [50] J.B. VAN DEN BERG, M. BREDEN, J.-P. LESSARD AND L. VAN VEEN. Spontaneous periodic orbits in the Navier-Stokes flow. *Journal of Nonlinear Science*, 31(2): paper No. 41 (61 pages), 2021.
- [49] R. CALLEJA, C. GARCIA-AZPEITIA, J.-P. LESSARD AND J.D. MIRELES JAMES. From the Lagrange polygon to the figure eight I: Numerical evidence extending a conjecture of Marchal. *Celestial Mechanics and Dynamical Astronomy*, 133 (10): 1–20, 2021.
- [48] R. CALLEJA, C. GARCIA-AZPEITIA, J.-P. LESSARD AND J.D. MIRELES JAMES. Torus knot choreographies in the n -body problem. *Nonlinearity*, 34 (1): 313–349, 2021.
- [47] J.-P. LESSARD AND J.D. MIRELES JAMES. A rigorous implicit C^1 Chebyshev integrator for delay equations. *Journal of Dynamics and Differential Equations*, 33(4): 1959–1988, 2021.
- [46] C. GARCIA-AZPEITIA AND J.-P. LESSARD. Free vibrations in a wave equation modeling MEMS. *SIAM Journal on Applied Dynamical Systems*, 19 (4): 2749–2782, 2020.
- [45] J.-P. LESSARD AND J.D. MIRELES JAMES. A functional analytic approach to validated numerics for eigenvalues of delay equations. *Journal of Computational Dynamics*, 7(1): 123–158, 2020.
- [44] Y. ALAMA AND J.-P. LESSARD. Traveling wave oscillatory patterns in a signed Kuramoto-Sivashinsky equation with absorption. *Journal of Computational and Applied Mathematics*, 372 (112608), 2020.
- [43] J. BURGOS-GARCIA, J.-P. LESSARD AND J.D. MIRELES JAMES. Spatial periodic orbits in the equilateral circular restricted four body problem: computer assisted proofs of existence. *Celestial Mechanics and Dynamical Astronomy*, 131(1): 1–36, 2019.
- [42] I. BALAZS, J.B. VAN DEN BERG, J. COURTOIS, J. DUDAS, J.-P. LESSARD, A. VÖRÖS-KISS, JF WILLIAMS AND X.Y. YIN. Computer-assisted proofs for radially symmetric solutions of PDEs. *Journal of Computational Dynamics*, 5(1-2): 61–80, 2018.
- [41] J.-P. LESSARD. Continuation of solutions and studying delay differential equations via rigorous numerics. *Rigorous numerics in dynamics*, 81–122, *Proc. Sympos. Appl. Math.*, 74, Amer. Math. Soc., Providence, RI, 2018.
- [40] R. CASTELLI, J.-P. LESSARD AND J.D. MIRELES JAMES. Parameterization of invariant manifolds for periodic orbits (II): a-posteriori analysis and computer assisted error bounds. *Journal of Dynamics and Differential Equations*, 30(4): 1525–1581, 2018.
- [39] J.-P. LESSARD. Computing discrete convolutions with verified accuracy via Banach algebras and the FFT. *Applications of Mathematics*, 63(3), 219–235, 2018.
- [38] M. BREDEN AND J.-P. LESSARD. Polynomial interpolation and a priori bootstrap for computer-assisted proofs in nonlinear ODEs. *Discrete and Continuous Dynamical Systems - Series B*, 23(7):2825–2858, 2018.

- [37] R. CASTELLI, M. GAMEIRO AND J.-P. LESSARD. Rigorous numerics for ill-posed PDEs: periodic orbits in the Boussinesq equation. *Archive for Rational Mechanics and Analysis*, 228(1):129–157, 2018.
- [36] J.B. VAN DEN BERG, M. BREDEN, J.-P. LESSARD AND M. MURRAY. Continuation of homoclinic orbits in the suspension bridge equation: a computer-assisted proof. *Journal of Differential Equations*, 264(5): 3086–3130, 2018.
- [35] J.-P. LESSARD, E. SANDER AND T. WANNER. Rigorous continuation of bifurcation points in the diblock copolymer equation. *Journal of Computational Dynamics*, 4(1-2), 71–118, 2017.
- [34] G. KISS AND J.-P. LESSARD. Rapidly and slowly oscillating periodic oscillations of a delayed van der Pol oscillator, *Journal of Dynamics and Differential Equations*, 29(4): 1233–1257, 2017.
- [33] J. JAQUETTE, J.-P. LESSARD AND K. MISCHAIKOW. Stability and uniqueness of slowly oscillating periodic solutions to Wright’s equation, *Journal of Differential Equations*, 263(11): 7263–7286, 2017.
- [32] R. DE LA LLAVE, J.-L. FIGUERAS, M. GAMEIRO AND J.-P. LESSARD. A framework for the numerical computation and a posteriori verification of invariant objects of evolution equations, *SIAM Journal on Applied Dynamical Systems* 16(2): 1070–1088, 2017.
- [31] M. GAMEIRO AND J.-P. LESSARD. A posteriori verification of invariant objects of evolution equations: periodic orbits in the Kuramoto-Sivashinsky PDE, *SIAM Journal on Applied Dynamical Systems*, 16(1): 687–728, 2017.
- [30] J.-P. LESSARD AND J.D. MIRELES JAMES. Computer assisted Fourier analysis in sequence spaces of varying regularity, *SIAM Journal on Mathematical Analysis*, 49(1), 530–561, 2017.
- [29] J.-P. LESSARD. Rigorous verification of saddle-node bifurcations in ODEs, *Indagationes Mathematicae*, 27(4): 1013–1026, 2016.
- [28] J.-P. LESSARD, J.D. MIRELES JAMES AND J. RANSFORD. Automatic differentiation for Fourier series and the radii polynomial approach, *Physica D*, 334: 174–186, 2016.
- [27] A. HUNGRIA, J.-P. LESSARD AND J.D. MIRELES JAMES. Rigorous numerics for analytic solutions of differential equations: the radii polynomial approach, *Mathematics of Computation*, 85(299): 1427–1459, 2016.
- [26] M. GAMEIRO, J.-P. LESSARD AND A. PUGLIESE. Computation of smooth manifolds via rigorous multi-parameter continuation in infinite dimensions, *Foundations of Computational Mathematics*, 16(2): 531–575, 2016.
- [25] M. BREDEN, J.-P. LESSARD AND J.D. MIRELES JAMES. Computation of maximal local (un)stable manifold patches by the parameterization method, *Indagationes Mathematicae*, 27(1): 340–367, 2016.
- [24] M. GAMEIRO, J.-P. LESSARD AND Y. RICAUD. Rigorous numerics for piecewise-smooth systems: a functional analytic approach based on Chebyshev series. *Journal of Computational and Applied Mathematics*, 292, 654–673, 2016.
- [23] R. CASTELLI, J.-P. LESSARD AND J.D. MIRELES JAMES. Analytic enclosure of the fundamental matrix solution. *Applications of Mathematics*, 60(6): 617–636, 2015.
- [22] J.B. VAN DEN BERG AND J.-P. LESSARD. Rigorous numerics in dynamics. *Notices of the American Mathematical Society*, 62(9): 1057–1061, 2015.

- [21] J.B. VAN DEN BERG, A. DESCHÊNES, J.-P. LESSARD AND J.D. MIRELES JAMES. Stationary coexistence of hexagons and rolls via rigorous computations. *SIAM Journal on Applied Dynamical Systems*, 14 (2), 942–979, 2015.
- [20] L. D’AMBROSIO, J.-P. LESSARD AND A. PUGLIESE. Blow-up profile for solutions of a fourth order nonlinear equation. *Nonlinear Analysis: Theory, Methods and Applications*, 121, 280–335, 2015.
- [19] M. BREDEN, L. DESVILLETES AND J.-P. LESSARD. Rigorous numerics for nonlinear operators with tridiagonal dominant linear parts. *Discrete and Continuous Dynamical Systems - Series A*, 35 (10), 4765–4789, 2015.
- [18] R. CASTELLI, J.-P. LESSARD AND J.D. MIRELES JAMES. Parameterization of invariant manifolds for periodic orbits (I): efficient numerics via the Floquet normal form. *SIAM Journal on Applied Dynamical Systems*, 14(1), 132–167, 2015.
- [17] A. CORREC AND J.-P. LESSARD. Coexistence of nontrivial solutions of the one-dimensional Ginzburg-Landau equation: a computer-assisted proof. *European Journal of Applied Mathematics*, 26(1): 33–60, 2015.
- [16] J.-P. LESSARD, J.D. MIRELES JAMES AND C. REINHARDT. Computer assisted proof of transverse saddle-to-saddle connecting orbits for first order vector fields. *Journal of Dynamics and Differential Equations*, 26(2): 267–313, 2014.
- [15] J.-P. LESSARD AND C. REINHARDT. Rigorous numerics for nonlinear differential equations using Chebyshev series. *SIAM Journal on Numerical Analysis*, 52(1): 1–22, 2014.
- [14] M. BREDEN, J.-P. LESSARD AND M. VANICAT. Global bifurcation diagram of steady states of systems of PDEs via rigorous numerics: a 3-component reaction-diffusion system. *Acta Mathematicae Applicandae*, 128(1): 113–152, 2013
- [13] R. CASTELLI AND J.-P. LESSARD. A method to rigorously enclose eigenpairs of complex interval matrices. *Applications of Mathematics 2013*. Institute of Mathematics, Academy of Sciences of the Czech Republic, Prague, 2013. ISBN 978-80-85823-61-5.
- [12] R. CASTELLI AND J.-P. LESSARD. Rigorous numerics in Floquet theory: computing stable and unstable bundles of periodic orbits. *SIAM Journal on Applied Dynamical Systems*, 12 (1): 204–245, 2013.
- [11] M. GAMEIRO AND J.-P. LESSARD. Efficient rigorous numerics for higher-dimensional PDEs via one-dimensional estimates. *SIAM Journal on Numerical Analysis*, 51(4), 2063–2087, 2013.
- [10] G. KISS AND J.-P. LESSARD. Computational fixed point theory for differential delay equations with multiple time lags. *Journal of Differential Equations*, 252 (4): 3093–3115, 2012.
- [9] J.B. VAN DEN BERG, J.-P. LESSARD, J.D. MIRELES JAMES AND K. MISCHAIKOW. Rigorous numerics for symmetric connecting orbits: even homoclinics of the Gray-Scott equation. *SIAM Journal on Mathematical Analysis*, 43 (4): 1557–1594, 2011.
- [8] M. GAMEIRO AND J.-P. LESSARD. Existence of secondary bifurcations or isolas for PDEs. *Nonlinear Analysis: Theory, Methods and Applications*, 74 (12): 4131–4137, 2011.
- [7] M. GAMEIRO AND J.-P. LESSARD. Rigorous computation of smooth branches of equilibria for the three-dimensional Cahn-Hilliard equation. *Numerische Mathematik*, 117 (4): 753–778, 2011.
- [6] M. GAMEIRO AND J.-P. LESSARD. Analytic estimates and rigorous continuation for equilibria of higher-dimensional PDEs. *Journal of Differential Equations*, 249 (9): 2237–2268, 2010.

- [5] J.B. VAN DEN BERG, J.-P. LESSARD AND K. MISCHAIKOW. Global smooth solution curves using rigorous branch following. *Mathematics of Computation*, 79 (271), 1565–1584, 2010.
- [4] J.-P. LESSARD. Recent advances about the uniqueness of the slowly oscillating periodic solutions of Wright’s equation. *Journal of Differential Equations*, 248 (5): 992–1016, 2010.
- [3] J.B. VAN DEN BERG AND J.-P. LESSARD. Chaotic braided solutions via rigorous numerics: chaos in the Swift-Hohenberg equation. *SIAM Journal on Applied Dynamical Systems*, 7(3): 988–1031, 2008.
- [2] M. GAMEIRO, J.-P. LESSARD AND K. MISCHAIKOW. Validated continuation over large parameter ranges for equilibria of PDEs. *Mathematics and Computers in Simulation*, 79 (4), 1368–1382, 2008.
- [1] S. DAY, J.-P. LESSARD AND K. MISCHAIKOW. Validated continuation for equilibria of PDEs. *SIAM Journal on Numerical Analysis*, 45 (4), 1398–1424, 2007.

Books

- J.B. VAN DEN BERG, M. GAMEIRO, J.-P. LESSARD, J.D. MIRELES JAMES AND K. MISCHAIKOW. Ordinary Differential Equations: A Constructive Approach. *Preliminary version available upon request*.
- J.B. VAN DEN BERG, M. GAMEIRO, J.-P. LESSARD, J.D. MIRELES JAMES AND K. MISCHAIKOW. Nonlinear Dynamics: A Constructive Approach: (book, in progress - 200 pages).
- J.B. VAN DEN BERG AND J.-P. LESSARD. *Rigorous Numerics in Dynamics*, Proceedings of Symposia in Applied Mathematics, Volume 74, 2018. ISBN: 978-1-4704-2814-3

Awards

- NSERC Accelerator Supplement Award, 2018–2021, \$120,000.
- Professeur Étoile de la Faculté des Sciences et de Génie de l’Université Laval, 2016-2017.
- CAIMS/PIMS Early Career Award in Applied Mathematics, 2016.
- Professeur Étoile de la Faculté des Sciences et de Génie de l’Université Laval, 2015-2016.
- John Festa Fellowship, Georgia Institute of Technology, 2004.

Funded Research

- NSERC Discovery Grants Program (Individual), 2024–2029, \$190,000 (38K/year).
- NSERC Discovery Grants Program (Individual), 2018–2024, \$210,000 (35K/year).
- NSERC Accelerator Supplement Award, 2018–2021, \$120,000.
- FAPEPS-CALDO Grant, 2013–2015, \$25,000.
- NSERC Discovery Grants Program (Individual), 2012–2018, \$156,000 (26K/year).
- FQRNT Programme *Établissement de Nouveaux Chercheurs*, 2012–2014, \$40,000.
- MICINN Grant, Spain. Co-applicant, 2012–2014. €38,500.
- Basque Excellence Research Centers (BERC) program from Ikerbasque, 2010-2011, \$95,000.
- NSF Mathematical Sciences Institutes Postdoctoral Fellowship, 2009–2010, \$52,000.

Editorial Activity

Member of the Editorial Board of *Journal of Dynamics and Differential Equations*, Springer.

Member of the Editorial Board of *Applications of Mathematics*, Springer.

Supervision of HQP

PH.D. STUDENTS

1. Kevin Constantineau, *Title TBD*, 2025–present.
2. Gabriel Remond-Tiedrez, *Title TBD*. 2024–present. (co-supervised with Jason Bramburger, Concordia)
3. Dominic Blanco, *Extensions in Computer-Assisted Analysis for Partial Differential Equations Posed on Unbounded Domains*. 2022–2026. (Starting in September 2026, Hill Assistant Professor of Mathematics at Rutgers University, New Jersey, USA)
4. Miguel Ayala, *Computer-assisted proofs for geometry optimization and gap solitons*. 2019–2026. (co-supervised with Rustum Choksi, McGill)
5. Gabriel Duchesne, *Rigorous computer-assisted methods for global structures in dynamical systems*. 2019–2025 (currently working as a Decision Analytics & Modeling Consultant at Direxion, Montreal, Canada).
6. Matthieu Cadiot, *Computer-Assisted Analysis for Partial Differential Equations and Non-local Equations on Euclidean Spaces*. 2020–2025. (co-supervised with J.-C. Nave, McGill) (Currently a FMJH post-doc at the Center for Applied Mathematics in École Polytechnique Paris, France)
7. Olivier Hénot, *Advances in computer-assisted proofs: invariant manifolds and connecting orbits*. 2018–2023. (Currently a Tenure-Track Assistant Professor in the Department of Mathematics of National Taiwan University, Taipei, Taiwan)
8. Maxime Breden, *Équations aux dérivées partielles et systèmes dynamiques appliqués à des problèmes issus de la physique et de la biologie*. 2014–2017. (co-supervised with Laurent Desvillettes, ENS Cachan) (Currently a Tenured Assistant Professor of Mathematics at École Polytechnique, France)
9. Tahmineh Azizi, *Neuroscience computationnelle et systèmes dynamiques*. 2015–2017. (Currently a Postdoc Research Associate at Washington University in St. Louis, USA)
10. Andréa Deschênes, *Méthode de calcul rigoureux pour les ondes progressives pour les EDP*. 2014–2017.
11. Pierre-Olivier Vallerand Beaudry, *Théorie Computationnelle de Morse-Floer*. 2011–2013. (Development tester for Ubisoft, Montreal)

MASTERS STUDENTS

1. Geoffrey Kelly, *Topic TBD*, 2026–2028. (co-supervised with Adam Oberman, McGill)
2. Marco Mignacca, *Rigorous proof of one-dimensional steady-states in a neural field model*, 2023–2025.
3. Kevin Constantineau, *Spatially inhomogeneous two-cycles in ecological integrodifference equations*, 2023–2025.
4. Matthieu Cadiot, *Bifurcations towards periodic solutions in quadratic semilinear partial differential equations*, 2018–2020. (co-supervised with Jean-Christophe Nave, McGill)

5. Yann Ricaud, *Rigorous parameterization of stable and unstable manifolds of fixed points from ODEs with polynomial vector field depending on parameters*, 2017–2020.
6. Gabriel Duchesne, *Computer-assisted proofs of nonlinear Laplace-Beltrami equations on the sphere*, 2017–2019.
7. Olivier Hénnot, *Configurations centrales en toile d'araignée*, 2017–2018.
(co-supervised with Christiane Rousseau, UdeM)
8. Francis Desjardins, *Construction axiomatique des ensembles de nombres: des naturels aux réels*, 2014–2016.
9. Maxime Murray, *Preuve rigoureuse d'une connection homocline pour l'équation du pont suspendu*, 2013–2015.
10. Abdoulaye Thiam, *A rigorous numerical method for the proof of Galaktionov's conjecture*, 2013–2015.
11. Andréa Deschênes, *Fronts stationnaires pour l'EDP de Swift-Hohenberg via le calcul rigoureux*, 2012–2014.
12. Maxime Breden, *Calcul rigoureux d'un diagramme de bifurcation d'un système d'EDPs* (Internship for the Masters I of ENS Cachan, France), May-July 2012.
13. Matthieu Vanicat, *Calcul rigoureux d'un diagramme de bifurcation d'un système d'EDPs* (Internship for the Masters I of ENS Cachan, France), May-July 2012.

POSTDOCTORAL STUDENTS

1. Kevin Church, McGill (NSERC Postdoc & CRM-Simons Postdoc), 2019–2022.
2. Roberto Castelli, Basque Center for Applied Mathematics (BCAM) (Postdoc), 2010–2011.
Title of the project: *Rigorous numerics in Floquet theory: computing (un)stable bundles of periodic orbits*.
3. Gabor Kiss, Basque Center for Applied Mathematics (BCAM) (Postdoc), 2010–2011. Title of the project: *Computational fixed-point theory for delay equations with multiple time lags*.

INTERNATIONAL INTERN STUDENTS

1. Joan Gimeno (University of Barcelona). Title of the project: *Delay differential equations and celestial mechanics*. Fall 2018 and Fall 2019.
2. Elena Queirolo (VU University Amsterdam). Title of the project: *Rigorous computation of Hopf bifurcations in ODEs*. Fall 2016.
3. Chris Groothedde (VU University Amsterdam). Title of the project: *Rigorous computing of periodic solutions for delay equations*. Fall 2014.
4. Maxime Breden (ENS Cachan). Title of the project: *Calcul rigoureux d'un diagramme de bifurcation d'un système d'EDPs*. Spring 2012.
5. Matthieu Vanicat (ENS Cachan). Title of the project: *Calcul rigoureux d'un diagramme de bifurcation d'un système d'EDPs*. Spring 2012.

UNDERGRADUATE RESEARCH STUDENTS SUPERVISION

1. Moez Mohammad (McGill), *Energy landscape characterization via computer-assisted proofs and machine learning*. SURF Undergraduate Student Research Project, Summer 2023.
2. Kevin Constantineau (McGill), *Standing 2-cycles in an integrodifference equation model from spatial ecology*. SURF Undergraduate Student Research Project, Summer 2022.

3. Kevin Constantineau (McGill), *Relative equilibria and periodic solutions from platonic solids of vortices on the sphere*. NSERC Undergraduate Student Research Project, Summer 2021.
4. Kevin Constantineau (McGill), *Relative equilibria, bifurcations and periodic orbits in Thomson's problem via computer-assisted proofs*. ISM Undergraduate Scholarships, Summer 2020.
5. Clément Fortin (McGill), *Gravitational billiards in a vibrating or rotating parabolic domain*. Paid Research Assistant, Summer 2020.
6. Jordan Paillé (McGill), *Computation of two-dimensional manifolds of relative equilibria in the circular restricted four-body problem*. Paid Research Assistant, Fall 2019.
7. Nathan Maves-Moore (McGill), *Computation of two-dimensional manifolds of relative equilibria in the circular restricted four-body problem*. Paid Research Assistant, Fall 2019.
8. Yvonne Bronsard Alama (McGill), *Existence and uniqueness of a periodic solution to a 4th order nonlinear ODE*. NSERC Undergraduate Student Research Project, Summer 2018.
9. Jordan Paillé (McGill), *Computation of two-dimensional manifolds of relative equilibria in the circular restricted four-body problem*. SURA Research Award, Summer 2018.
10. Nathan Maves-Moore (McGill), *Computation of two-dimensional manifolds of relative equilibria in the circular restricted four-body problem*. Arts Undergraduate Research Internship Award (ARIA), Summer 2018.
11. Yann Ricaud (Laval), *Chaos de Shilnikov*. FSG Research Summer Scholarships, Summer 2016.
12. Yann Ricaud (Laval), *Calcul rigoureux de solutions périodiques du problème à quatre corps restreint*. ISM-CRM Undergraduate Summer Scholarships, Summer 2015.
13. Rosalie Bentz-Moffett (Laval), *Solution périodique d'une EDO se ramenant à une solution des équations de Navier-Stokes*. NSERC Undergraduate Student Research Project, Summer 2014.
14. Julian Ransford (Laval), *Calcul rigoureux de solutions périodiques du problème à trois corps restreint*. NSERC Undergraduate Student Research Project, Summer 2014.
15. Yann Ricaud (Laval), *Méthodes numériques rigoureuses pour l'étude des systèmes de Filippov*. NSERC Undergraduate Student Research Project, Summer 2014.
16. Karine Larouche (Laval), *L'étude des systèmes d'EDOs à l'aide du calcul numérique*. NSERC Undergraduate Student Research Project, Summer 2013.
17. Anaïs Correc (Laval), *Calculs de solutions d'une EDP de type gradient*. NSERC Undergraduate Student Research Project, Summer 2012.
18. Andréa Deschênes (Laval), *Calcul rigoureux de connexions hétéroclines d'une EDO*. NSERC Undergraduate Student Research Project, Summer 2012.

UNDERGRADUATE THESIS

1. Gabriel Duchesne, *Les méthodes de preuves assistées par ordinateur pour l'étude des EDO non linéaires*, Spring 2017.
2. Yann Ricaud, *Méthode de continuation et détection de bifurcations*, Spring 2016.
3. Francis Desjardins, *Calcul rigoureux d'une variété stable de l'équation de Fisher-Kolmogorov*, Spring 2014.
4. Maxime Murray, *Théorie du chaos et dynamique symbolique*, Spring 2013.
5. Anaïs Correc, *Calcul d'un diagramme de bifurcations de solutions du BVP de Ginzburg-Landau*, Spring 2013.

6. Cynthia Paquet, *Théorie des bifurcations et calcul pour les solutions stationnaires des EDPs*, Spring 2012.
7. Andréa Deschênes, *Méthodes de calcul des connexions homoclines et hétéroclines des EDOs*, Spring 2012.

Invited Presentations as a Plenary or Main Speaker

- Invited Speaker at the Conference *Mathematical Modeling & Dynamics with Delay* (In honour of the 60th birthday of Tony Humphries) held at Queen's University in June 2026. Title: *Computer-Assisted and Constructive Methods for Periodic Orbits in Differential Equations with Large State-Dependent Delays*.
- Keynote Speaker at *2025 Applied Analysis Day* held at University of Ottawa in October 2025. Title: *The Path from Lagrange's Triangle to the Figure Eight: Resolving Marchal's Conjecture*.
- Invited Speaker at the *2025 Gene Golub SIAM Summer School on Frontiers in multi-dimensional pattern formation* held at Concordia University, Montreal, Canada, in August 2025.
Talk 1: *Computer-Assisted Proofs in Nonlinear Analysis: Motivations and Philosophy*.
Talk 2: *Interval Arithmetic: Introduction and Examples*.
Talk 3: *Equilibria in the Swift-Hohenberg PDE on the interval: CAPs of existence*.
- Invited Speaker at the conference *From Topology to Computations in Dynamical Systems* held at Jagiellonian University in Krakow, Poland in June 2024. Title: *Dynamics of delay maps (part I): periodic orbits and their Morse indices*.
- Invited Speaker at the workshop *Computer assisted proofs for stability analysis of nonlinear waves* held at the *American Institute of Mathematics* in Palo Alto, California, USA in June 2023. Title: *Computer-assisted proofs for semi-linear PDEs on $\mathbb{R}^n$ via spectral methods*.
- Plenary speaker at the *XIII Americas Conference on Differential Equations and Nonlinear Analysis* at the University of São Paulo in São Carlos in February 2023. Title: *Localized radial and non-radial solutions of elliptic equations on unbounded domains: computer-assisted proofs of existence*
- Invited Speaker at the *Equadiff 2022* Conference held in Brno, Czech Republic in July 2022. Title: *Recent developments of computer-assisted proofs in differential equations*.
- Plenary speaker at the *International Workshop on Reliable Computing and Computer-Assisted Proofs* (ReCAP 2022), Japan (virtual) in March 2022. Title: *The parameterization method: an overview, rigorous numerics and applications*.
- Main speaker at the Workshop on Controlling Error and Efficiency of Numerical Models, Fields Institute, Toronto, Canada (virtual) in December 2021. Title: *Computer-assisted proofs of existence of periodic motions in fluids*.
- Main speaker at the Workshop MFO Dynamics of Waves and Patterns, Oberwolfach, Germany (virtual) in August 2021. Title: *Rigorous validated numerics for the study of patterns in the Phase-Field-Crystal (PFC) model*.
- Plenary speaker at the *SIAM Conference on Applications of Dynamical Systems (DS21)* in Portland, Oregon, USA in May 2021. Title: *Recent developments of computer-assisted proofs in infinite dimensional dynamical systems*.

- Plenary speaker at the *11th Colloquium on the Qualitative Theory of Differential Equations* at the University of Szeged (Hungary) in June 2019. Title: *Recent developments of computer-assisted proofs in infinite dimensional dynamical systems*.
- Main speaker of the tutorial entitled *A Computer-Assisted Constructive Approach to Nonlinear Dynamical Systems* at the CRM in Montreal in April 2019. Title of talks: *Periodic orbits via Fourier series* and *Applications in PDEs*.
- Speaker in the *Lefschetz Center for Dynamical Systems Seminar* at Brown University, Rhode Island in March 2019. Title: *Spontaneous periodic orbits in the Navier-Stokes flow*.
- Main speaker in the 3-days course *Computer assisted proofs in Nonlinear Dynamics* held at Universidad Nacional Autónoma de México (UNAM), Mexico, August 1–3, 2018. Titles: *Radially symmetric solutions of PDEs*, *Dynamics of delay equations* and *Applications & Results*.
- Invited speaker at the conference *Algebraic Topology in Data and Dynamics* held at Montana State University, Bozeman, USA in July 2018. Title: *Towards computational Morse-Floer homology*.
- Invited speaker at the *Third International Conference on the Dynamics of Differential Equations In Memory of Professor Jack K. Hale* held at Hiroshima University, Japan in March 2018. Title: *Toward a proof of Jones conjecture in delay equations*.
- Plenary speaker at the *Winter Workshop on Dynamics, Topology and Computations* at the Stefan Banach International Mathematical Center (Poland) in January 2018. Title: *Rigorously verified numerics for infinite dimensional nonlinear problems: a functional analytic approach*.
- Plenary speaker at the *XI Americas Conference on Differential Equations and Nonlinear Analysis* at the University of Alberta in August 2017. Title: *Rigorously verified computing for infinite dimensional nonlinear dynamics: a functional analytic approach*.
- Speaker at the *Coloquios del Departamento de Matemática* of the Universidad de Buenos Aires in November 2016. Title: *Rigorously verified computing for infinite dimensional nonlinear dynamics: a functional analytic approach*.
- Plenary speaker at the conference *International Symposium on Scientific Computing, Computer Arithmetic and Verified Numerics* held at Uppsala University in Sweden in September 2016. Title: *Rigorously verified computing for infinite dimensional nonlinear dynamics: a functional analytic approach*.
- Invited speaker at the *Colloque des sciences mathématiques du Québec* to be held at Université de Montréal on October 14th, 2016. Title: *Rigorously verified computing for infinite dimensional nonlinear dynamics: a functional analytic approach*.
- Plenary speaker at the *CAIMS Annual Meeting* held at the University of Alberta in Edmonton in June 2016. Title: *Rigorously verified computing for infinite dimensional nonlinear dynamics: a functional analytic approach*.
- Plenary speaker at the conference *Structural Dynamical Systems: Computational Aspects* held in Monopoli in Italy in June 2016. Title: *Computer-assisted proofs for periodic orbits of dissipative and ill-posed PDEs*.
- Main speaker at the workshop *Computation in Dynamics* held at the Institute for Computational and Experimental Research in Mathematics (ICERM) at Brown University in Providence, USA in April 2016. Title: *Computer-assisted proofs for periodic orbits of PDEs*.

- Main speaker at the workshop *Advanced Computing and Theoretical Fluid Mechanics* held at the Fields Institute in Toronto in January 2016. Title: *Computer-assisted proofs for periodic orbits of PDEs*.
- Main lecturer at the *PIMS-SFU Summer School on Rigorous Computing: Analysis, Scientific Computing & Dynamical Systems* held at Simon Fraser University in June 2015.
- Main speaker at the workshop *From Topological to Stochastic Techniques in Dynamical Systems* held at the Lorentz Center in Leiden in the Netherlands in June 2014. Title: *Rigorous computations of solutions of continuous dynamical systems*.
- Main speaker at the workshop *IMA Special Workshop Joint US-Japan Conference for Young Researchers on Interactions among Localized Patterns in Dissipative Systems* held at the IMA in Minneapolis, USA in June 2013. Title: *Periodic orbits of dissipative PDEs via rigorous numerics: the Kuramoto-Sivashinsky equation*.
- Main speaker at the *Southern Ontario Dynamics Day* held at the Fields Institute, Toronto in April 2013. Title: *Rigorous computations for infinite dimensional dynamical systems*.
- Invited speaker at the *First International Conference on Dynamics of Differential Equations in honour of Jack Hale* held at Georgia Institute of Technology, Atlanta, USA in March 2013. Title: *Rigorous numerics for nonlinear differential equations using Chebyshev series*.
- Invited speaker at workshop *State-Dependent Delay Equations International Workshop* held at the Max-Planck Institute in Dresden, Germany in October 2009. Title: *Computer-assisted proofs for delay differential equations*.
- Main speaker at the conference *Dynamics, Topology and Computations 2009* held at the Mathematical Research and Conference Center in Bedlewo, Poland in June 2009. Title: *Rigorous computation of smooth branches of periodic solutions of delay equations*.
- Main speaker at the workshop *Computational and Topological Aspect of Dynamics* held at the Lorentz Center in Leiden in the Netherlands in May 2006. Title: *Getting a rigorous skeleton of equilibria of nonlinear PDEs using path-following techniques*.

Professional Activities

1. Main organizer of the Semester long program *Computational Dynamics – Analysis, Topology & Data* at the CRM in Montreal, Canada (September-December 2024).
2. Main organizer of the tutorial *Constructive study of nonlinear equations via computer-assisted proofs* at the CRM in Montreal, Canada (September 2024).
3. Co-organizer of the 5 Days Workshop *Towards rigorous results in state-dependent delay equations* at the Lorentz Center in Leiden, The Netherlands (March 2024).
4. Main organizer of the workshop *Computer-assisted proofs in nonlinear analysis* at the CRM in Montreal, Canada (September 2024).
5. Co-organizer of the mini-symposium *Computer-assisted proofs in differential equations* the 2023 International Congress on Industrial and Applied Mathematics (ICIAM 2023), Tokyo, Japan (August 2023).
6. Main organizer of the CRM CAMP activities, namely weekly seminars, colloquia, spotlight on graduate research and open problem series, (June 2020 - June 2021).
See <http://www.crm.umontreal.ca/camp-nonlinear>

7. Organizer of the *École Langlands du Centre de Recherches Mathématiques* at the CRM in Montreal, Canada (August 2021).
8. Deputy director of scientific programs at the Centre de Recherche Mathématiques (CRM), Montreal (2019-2021).
9. Co-organizer of the 5 Days Workshop *Connections in Infinite Dimensional Dynamics* at BIRS, Banff, Alberta, Canada (May 2020).
10. Co-organizer of the special session *Computer-assisted proofs in dynamics* at the Equadiff 2019 Conference in Leiden, The Netherlands (July 2019).
11. Main organizer of the Monthly Program *Topological and Rigorous Computational Methods for High Dimensional Dynamics* at the CRM in Montreal, Canada (April 2019).
12. Co-organizer of the 5 Days Workshop *Rigorous Numerics for Infinite Dimensional Nonlinear Dynamics* at BIRS, Banff, Alberta, Canada (May 2017).
13. Main organizer of the CRM Applied Math Seminar, McGill University, Montreal (2017-2020)
14. Co-organizer of the 5 Days Workshop *Computational Proofs for Dynamics in PDEs* at the Lorentz Center in Leiden (June 2016).
15. Co-organizer of the AMS Short Course *Rigorous Numerics in Dynamics* at the AMS National Meeting in Seattle (January 2016).
16. Co-organizer of the special session *Computational and Topological Methods in Dynamical Systems* at the CMS Winter Meeting in Montreal, Canada (December 2015).
17. Co-organizer of the *PIMS-SFU Summer School on Rigorous Computing: Analysis, Scientific Computing & Dynamical Systems* held at Simon Fraser University, BC, Canada (June 2015).
18. Co-organizer of the 5 Days Workshop *Rigorously Verified Computing for Infinite Dimensional Nonlinear Dynamics* at BIRS, Banff, Alberta, Canada (September 2014).
19. Organizer of the special session *Rigorous computations for nonlinear PDEs* at the SIAM Annual Meeting in Chicago, USA (July 2014).
20. Member of the local scientific committee of the *Centre de Recherches Mathématiques* (CRM) in Montreal (2013–2016).
21. Member of the evaluation committee of the 2014–2016 M.Sc. grant program in applied mathematics of the *Fonds de Recherche du Québec - Nature et Technologies* (FRQNT).
22. External Scientific Member of the Basque Center for Applied Mathematics (BCAM), Spain (2011–2016).
23. Co-organizer of the *2013 CAIMS Annual Meeting*, Quebec City, Canada, June 2013.
24. Co-organizer of the mini-symposium *Rigorous Numerics for ODEs and PDEs* (MS25) at the SIAM Conference on Applications of Dynamical Systems, Snowbird, 2013.
25. Organizer of the *Workshop on rigorous computations in dynamical systems*, Université Laval, Mai 2012.
26. Member of the *Groupe Interdisciplinaire de Recherche en Éléments Finis* (GIREF) at Université Laval, 2011-present.

27. Organizer of the one week intensive course *Rigorous computations for the study of dynamical systems* at the Basque Center for Applied Mathematics (BCAM), Spain, June 2011.
28. Member of the reading committee of the scientific journal *Nature* in 2010–2011.
29. Co-organizer of the *BCAM mini-symposium on Computational Mathematics*, Spain, February 2011.
30. Referee for the program *Project Grant Schemes* of the *Portuguese Foundation of Science and Technology*, 2010.
31. Co-organizer of the special session *Topological and Computational Dynamics* at the 2010 Spring Eastern Sectional AMS Meeting, Newark, NJ, 2010.
32. Co-organizer of the mini-symposium *Topology and Computations in Dynamics* (MS9) at the SIAM Conference on Applications of Dynamical Systems, Snowbird, 2009.

Other Selected Invited Talks

Existence of Stationary Non-Radial Localized Patterns in the Planar Swift-Hohenberg Equation, SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS26), Concordia University, Montreal, 05/2026.

A constructive approach for proving existence of periodic orbits in differential equations with state-dependent delays, Colloquium of the Department of Mathematics and Statistics, Florida Atlantic University, USA, 04/2026.

How an equilateral triangle becomes an eight: symmetry and proof in the three-body problem, Seminar of the Group of Nonlinear Mathematical Analysis, Nicolaus Copernicus University, Toruń, Poland, 03/2026.

Recent advances about the rigorous integration of parabolic PDEs via fully spectral Fourier-Chebyshev expansions, *Dynamics, Topology and Computations Conference (DyToComp 2025)*, Mathematical Research and Conference Center, Bedlewo, Poland, 06/2025.

Periodic localized traveling waves in the two-dimensional suspension bridge equation: computer-assisted proofs of existence, Seminar on Partial Differential Equations, Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic, 06/2025.

Cusp bifurcations: numerical detection via two-parameter continuation and computer-assisted proofs of existence, Current Problems in Numerical Analysis Seminar, Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic, 06/2025.

From the Lagrange Triangle to the Figure Eight Choreography: Proof of Marchal's Conjecture, Numerical Analysis Seminar, University of Bari, Italy, 04/2025.

An Introduction to Computer-Assisted Proofs in Nonlinear Analysis. Lecture I - Newton-Kantorovich Theorem, Finite dimensional problems and Interval Arithmetic, Nicolaus Copernicus University, Toruń, Poland, 04/2025.

An Introduction to Computer-Assisted Proofs in Nonlinear Analysis. Lecture II - Initial value problems via Taylor Methods, Nicolaus Copernicus University, Toruń, Poland, 04/2025.

An Introduction to Computer-Assisted Proofs in Nonlinear Analysis. Lecture III - Invariant manifolds and Radially Symmetric Solutions of Reaction-Diffusion PDEs, Nicolaus Copernicus University, Toruń, Poland, 04/2025.

From the Lagrange triangle to the figure eight: a proof of Marchal's conjecture, Dynamical Systems Seminar, Jagiellonian University, Poland, 11/2024.

Investigating Differential Equations with Non-Polynomial Nonlinearities: Utilizing FFT in Computer-Assisted Proofs, PDEs Seminar, Jagiellonian University, Poland, 11/2024.

From the Lagrange triangle to the figure eight choreography: proof of Marchal's conjecture, Current Problems in Numerical Analysis Seminar, Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic, 06/2024.

Exploring Differential Equations with Non-Polynomial Nonlinearities: Leveraging the FFT for Computer-Assisted Proofs, Equadiff 2024, Karlstad University, Sweden, 06/2024.

Computer Assisted Studies in Fluid Mechanics and Spectral Geometry, Uppsala University, Sweden, 06/2024.

Validated enclosures of Fourier coefficients in Banach spaces of analytic functions, CDSNS Colloquium, Georgia Tech, Atlanta, USA, 05/2024.

Computer-assisted proofs for differential equations with non-polynomial nonlinearities via the FFT, Analysis and Applications Seminar, Florida Atlantic University, USA, 04/2024.

Computer-assisted proofs for differential equations with non-polynomial nonlinearities via the FFT, Applied and Computational Mathematics Seminar, Rutgers University, USA, 04/2024.

Stationary non-radial localized patterns in the planar Swift-Hohenberg PDE: computer-assisted proofs of existence, Foundation of Computational Mathematics (FoCM) 2023, Paris, France, 06/2023.

Existence constructive de solutions d'EDP semi-linéaires dans $\mathbb{R}^n$ via des méthodes spectrales et des preuves assistées par ordinateur. SMAI2023 Conference, La Guadeloupe, France. 05/2023.

Localized radial solutions of elliptic equations on unbounded domains: computer-assisted proofs of existence, SIAM Conference on Applications of Dynamical Systems. Portland, Oregon, USA. 05/2023.

Localized radial and non-radial solutions of elliptic equations on unbounded domains: computer-assisted proofs of existence. Seminar on Analysis and Applications, Florida Atlantic University, Boca Raton, USA. 04/2023.

Towards computational Morse-Floer homology: forcing results for connecting orbits by computing relative indices of critical points. Dynamics, Topology and Computations 2022. Stephan Banach International Math Center, Bedlewo, Poland. 06/2022.

Radially symmetric equilibria of PDEs on $\mathbb{R}^d$: computer-assisted proofs of existence. Structural Dynamical Systems 2022: Computational Aspects. Rosa Marina, Ostuni. 06/2022.

Computing invariant manifolds via the parameterization method: an overview, rigorous numerics and applications. Current Problems in Numerical Analysis Seminar of the Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic. 04/2022.

Computer-assisted proofs for stable and unstable manifolds via the parameterization method. Nonlinear Dynamics Seminar, Free University Berlin, Germany. 04/2022.

Computer-assisted proofs of existence of periodic motions in fluids. (Online) Webinar on Nonlinear Evolutionary Dynamics, National Center for Theoretical Sciences (NCTS), Math Division, Taipei, Taiwan. 03/2022.

Periodic motions in fluids: computer-assisted proofs of existence. Mathematics Colloquium of University of Bari, Italy, 02/2022.

Rigorous validated numerics for the study of patterns in the Phase-Field-Crystal (PFC) model, Jagiellonian University, Krakow, Poland, 02/2022.

A rigorous implicit C^1 Chebyshev integrator for delay equations, Jagiellonian University, Krakow, Poland, 02/2022.

Computer-assisted proofs of existence of periodic motions in fluids. Seminar in Numerical Mathematics, Charles University, Prague, 12/2021.

Recent developments of computer-assisted proofs in the Navier-Stokes equations. Geometry, Dynamics and Mechanics Seminar, Università degli Studi di Padova, Italy (Virtual), 10/2021.

Recent developments of computer-assisted proofs in the Navier-Stokes equations. University of Warsaw, Poland, 10/2021.

Spontaneous periodic orbits in the Navier-Stokes flow. Webinar on Evolution Equations and Dynamical Systems, University of São Paulo, Brazil. 04/2021.

A functional analytic approach to rigorous numerics in dynamics: an introduction. (Online) AGH Seminar - Krakow, Poland. 04/2021.

Computer-assisted proofs for Cauchy problems of delay equations and PDEs via Chebyshev series. CRM CAMP Seminar, Montreal, Canada. 03/2021.

A fully spectral validated forward integration scheme for parabolic PDEs via Fourier/Chebyshev series. 2021 AMS Spring Southeastern Sectional Meeting, Georgia Tech, USA (virtual). 03/2021.

A rigorous implicit C^1 Chebyshev integrator for delay equations. 2021 AMS Spring Southeastern Sectional Meeting, Georgia Tech, USA (virtual). 03/2021.

Preuves assistées par ordinateur pour l'existence de solutions périodiques spontanées dans les équations de Navier-Stokes. Séminaire de l'équipe modélisation et calcul scientifique, Université Sorbonne Paris Nord, France (virtual). 02/2021.

Spontaneous periodic orbits in the Navier-Stokes flow via computer-assisted proofs. Computational Mathematics and Applications Seminar, University of Oxford, UK (virtual). 01/2021.

Spontaneous periodic orbits in the Navier-Stokes flow. Workshop 2020 Partial Differential Equations, Charles University, Prague, Czech Republic. 09/2020.

Rigorous integration of infinite dimensional dynamical systems via Chebyshev series. CAPA (Virtual) Seminar, Uppsala, Sweden. 06/2020.

Rigorous numerics for Complex Ginzburg-Landau equations. The 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, Spain. 07/2019.

Rigorous integration for some infinite dimensional dynamical systems. Equadiff 2019, Leiden, The Netherlands. 07/2019

Recent Developments for Infinite Dimensional Dynamical Systems. SIAM Conference on Applications of Dynamical Systems. Snowbird, Utah, USA. 05/2019.

A proof of Jones' conjecture. The 18th International Symposium on Scientific Computing, Computer Arithmetic, and Verified Numerical Computations, Waseda University, Tokyo, Japan. 09/2018.

Spatial periodic orbits in the equilateral circular restricted four body problem: computer-assisted proofs of existence. APPLICATIONS OF MATHEMATICS 2018 Conference, Institute of Mathematics, Prague, Czech Republic. 08/2018.

Infinite dimensional dynamical systems and the Navier-Stokes equations: a rigorous computational approach. Numerical Analysis Seminar of the Czech Academy of Science, Prague, Czech Republic. 06/2017.

Existence of non trivial time periodic orbits in the forced 2D Navier-Stokes equations: a computer-assisted proof. SIAM Conference on Applications of Dynamical Systems. Snowbird, Utah, USA. 05/2017.

Infinite dimensional dynamical systems and the Navier-Stokes equations: a rigorous computational approach. Special Lecture, University of Ottawa, Ottawa, Canada. 01/2017.

Infinite dimensional dynamical systems and the Navier-Stokes equations: a rigorous computational approach. Applied Math Seminar, McGill University, Montreal, Canada. 12/2016.

Rigorously verified computing for infinite dimensional nonlinear dynamics: a functional analytic approach. Dynamical Systems Seminar, Cornell University, Ithaca, USA. 11/2016.

Halo periodic orbits in the spatial circular restricted four body problem: a computer-assisted proof. Dynamics Days Latin America and the Caribbean, Puebla, Mexico, 10/2016.

Computer-assisted proofs for long periodic orbits of parabolic PDEs and their stability. The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, USA, 7/2016.

Periodic orbits of strongly indefinite ill-posed PDEs via rigorous numerics. The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, USA, 7/2016.

Rigorously verified computing for infinite dimensional nonlinear dynamics: a functional analytic approach. X Americas Conference on Differential Equations and Nonlinear Analysis, Buenos Aires, Argentina, 2/2015.

Coexistence of hexagons and rolls. Computational Dynamics workshop at the Foundations of Computational Mathematics conference, Montevideo, Uruguay, 12/2014.

Rigorous computation for infinite dimensional nonlinear dynamics: some difficulties and challenges. American Institute of Mathematics, Palo Alto, California. Workshop Rigorous computation for infinite dimensional nonlinear dynamics. 08/2013

Computation of solutions of nonlinear differential equations using Chebyshev series and rigorous numerics. Applied and Computational Math Seminar, George Mason University, Fairfax, Virginia, USA. 04/2013.

Méthodes de preuve assistée par ordinateur pour l'étude de systèmes d'EDP de type réaction-diffusion. Séminaire du Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie (Paris VI), Paris, France. 01/2013.

Rigorous computations for infinite dimensional dynamical systems. 2012 CMS Winter Meeting - Canadian Mathematical Society, Montreal, Canada. 12/2012.

An integration-free approach to rigorously compute time-periodic solutions of PDEs. Dynamics, Topology and Computations 2012. Stephan Banach International Math Center, Bedlewo, Poland. 06/2012.

Rigorous numerics in Floquet theory: computing stable and unstable bundles of periodic orbits. Foundation of Computational Mathematics (FoCM) 2011, Budapest, Hungary, 7/2011.

Curse of dimensionality free validating methods for PDEs. Euskadi-Kyushu 2011 Workshop on Applied Mathematics, Basque Center for Applied Mathematics, Spain, 3/2011.

Rigorous computation of connecting orbits for flows. Emerging Topics in Dynamical Systems and Partial Differential Equations (DSPDEs'10), Barcelona, Spain, 6/2010.

Topology and computations for high dimensional PDEs. Emerging Topics in Dynamical Systems and Partial Differential Equations (DSPDEs'10), Barcelona, Spain, 6/2010.

Toward a computational Morse theory: rigorous computations of equilibria and connecting orbits. Workshop on Topology: Identifying Order in Complex Systems, IAS, Princeton, 4/2010.

A general fixed point method for the study of dynamical systems. Conference on Boundary Value Problems. Santiago de Compostela, Spain. 09/2008.

Recent advances about the uniqueness of the slowly oscillating periodic solutions of Wright's equation. 7th International Conference on Dynamical Systems, Differential Equations and Applications. Arlington, Texas, USA. 05/2008.

Validated continuation for infinite dimensional problems. 6th International Congress on Industrial and Applied Mathematics (ICIAM 2007). Zürich, Switzerland. 07/2007.

Chaotic braided solutions via rigorous numerics. SIAM Conference on Applications of Dynamical Systems. Snowbird, Utah, USA. 05/2007.

Toward rigorous computation of global dynamics of gradient PDEs. 4th International Workshop on Taylor Methods. Boca Raton, Florida, USA. 12/2006.

Reviewer for journals

1. Applications of Mathematics (Springer)
2. Communications in Nonlinear Science and Numerical Simulation (Elsevier)
3. Discrete and Continuous Dynamical Systems
4. Foundations of Computational Mathematics (Springer)
5. Indagationes Mathematicae (Elsevier)
6. Journal of Computational Dynamics (AIMS)
7. Journal of Differential Equations (Elsevier)
8. Journal of Nonlinear Science (Springer)
9. Nonlinearity (London Mathematical Society)
10. SIAM Journal on Applied Dynamical Systems (SIAM)
11. SIAM Journal on Numerical Analysis (SIAM)
12. Physica D: Nonlinear Phenomena (Elsevier)
13. Transactions on Mathematical Software

Other Talks in Conferences, Seminars and Workshops

Rigorous numerics for ill-posed PDEs: periodic orbits in the Boussinesq equation. Analysis and Applications Seminar, Florida Atlantic University, USA, 10/2015.

Rigorous computations for infinite dimensional nonlinear dynamics, and an application to pattern formation. Applied Math Colloquium, University of São Paulo, Brazil, 8/2015.

Rigorous Computing in Strongly Indefinite Problems. SIAM Conference on Applications of Dynamical Systems. Snowbird, Utah, USA. 5/2015.

Analyse non linéaire assistée par ordinateur pour l'étude des systèmes dynamiques. Séminaire du groupe d'analyse de l'Université Laval, 9/2014.

Rigorous computations for nonlinear PDEs: an introduction. SIAM Annual Meeting, Chicago, 7/2014.

Rigorous numerics for connecting orbits in dynamical systems. Structural Dynamical Systems 2014: Computational Aspects. Capitolo, Monopoli, Italy. 6/2014.

Rigorous numerics for connecting orbits in dynamical systems. CRM Applied Math Seminar, McGill University, Canada, 04/2014.

Periodic orbits of dissipative PDEs via rigorous numerics: the Kuramoto-Sivashinsky equation. 2013 CAIMS Annual Meeting. Québec, Canada, 06/2013.

Periodic Orbits of Dissipative PDEs via Rigorous Numerics: the Kuramoto-Sivashinsky Equation. Joint US-Japan Conference for Young Researchers on Interactions among Localized Patterns in Dissipative Systems, IMA, Minnesota, USA, 6/2013.

Méthodes de preuve assistée par ordinateur pour l'étude de systèmes d'EDP de type réaction-diffusion, ENS Cachan, Paris, France, 01/2013.

Rigorous Computations for Infinite Dimensional Problems. 2012 ISM Summer School, UQAM, Montreal, Canada, 05/2012.

Rigorous Computations for Infinite Dimensional Nonlinear Problems. BCAM Seminar, Bilbao, Spain, 05/2012.

Le calcul numérique et les preuves assistées par ordinateur: une brève introduction, Partie II. Séminaire du GIREF, 02/2012.

Le calcul numérique et les preuves assistées par ordinateur: une brève introduction, Partie I. Séminaire du GIREF, 01/2012.

Curse of dimensionality free validating methods for PDEs. CRM Applied Math Seminar, McGill University, Canada, 11/2011.

Topology and computations in dynamics. University of the Basque Country, Leioa, Spain, 04/2011.

Curse of dimensionality free validating methods for PDEs. Workshop on Mathematics of Microbes. Imperial College London, UK, 04/2011.

Méthodes numériques rigoureuses. École Normale Supérieure, Cachan, France, 03/2011.

Computation of homoclinic and heteroclinic orbits for flows. BCAM Mini-Symposium on Computational Mathematics, Basque Center for Applied Mathematics, Spain, 02/2011.

Rigorous computations for infinite dimensional dynamical systems. First meeting BCAM-INRIA, Bordeaux, France, 09/2010.

Morse theory and its applications to differential equations. Basque Center for Applied Mathematics, Spain, 09/2010.

Rigorous Computations of Connecting Orbits for Flows Part II: Contraction Mapping, Radii Polynomials and the Gray-Scott equation. AMS Sectional Meeting, Newark, USA. 05/2010.

Calcul rigoureux et topologie pour l'étude de systèmes dynamiques de dimension infinie. Université Laval, Québec, Canada, 05/2010.

Rigorous Computation of Connecting Orbits for Flows. University of Kansas, Lawrence, Kansas, USA, 03/2010.

Topology and computations in dynamics. BCAM, Bilbao, Spain, 02/2010.

Topology and Computations for the Global Study of Nonlinear Problems. McGill University, Quebec, Canada. 02/2010.

A priori estimates and validated continuation for equilibria of high dimensional PDEs. George Mason University, VA, USA, 11/2009.

Forcing theorems in differential equations. University of Texas at Austin, Texas, USA, 11/2009.

Rigorous path-following techniques for periodic solutions of delay equations. SIAM Conference on Applications of Dynamical Systems. Snowbird, Utah, USA. 05/2009.

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