



• Ghislain Haine •

he/him

Associate Professor in Applied Mathematics at the Complex Systems Engineering Department of ISAE-SUPAERO

Curriculum vitæ

Education

- **Ph.D. in Applied Mathematics**, Université de Lorraine (France), 2012
 - Defended in October 2012, entitled *Observateurs en dimension infinie. Application à l'étude de quelques problèmes inverses*, under the supervision of Karim Ramdani and Marius Tucsnak.
- **Master's Degree in Applied Mathematics**, Université de Lorraine (France), 2009
- **Bachelor's Degree in Applied Mathematics and Computer Science**, Université de Lorraine (France), 2006

Work experience

- **Since 2013 - Associate Professor**
ISAE-SUPAERO - Université de Toulouse
Duties included:
 - Lectures, practical sessions, and tutorial classes
 - Research project development and management
 - Improvement and redesign of engineering programs
- **2012–2013 - Research Assistant (ATER)**
Université de Lorraine
Duties included:
 - Practical teaching at Mines de Nancy
 - Tutorial classes at Université de Lorraine
- **2009–2012 - PhD Student with Teaching Duties**
Université de Lorraine
Duties included:
 - Practical teaching at Mines de Nancy
 - Member of the INRIA outreach working group
 - Webmaster of the PhD students' website of the laboratory

PhD advisor

1. **Antoine Bendimerad-Hohl**: *Discrétisation structurée de systèmes Hamiltoniens à ports d'interaction implicites*. Supervised with Laurent Lefèvre and Denis Matignon. Started in October 2022, defense on November, the 5th.
2. **Anass Serhani**: *Systèmes couplés d'EDPs, vus comme des systèmes Hamiltoniens à ports avec dissipation : Analyse théorique et simulation numérique*. Supervised with Denis Matignon. Started in October 2017, defense on September 2020, the 28th.
3. **Guillaume Delay**: *Étude d'un problème d'interaction fluide-structure : modélisation, analyse, stabilisation et simulations numériques*. Supervised with Sylvain Ervedoza and Michel Fournié. Started in November 2015, defense on August 2018, the 31st.

Service and leadership

- **2015–2024** - In charge of the core Applied Mathematics course in the engineering program
- **2020–2023** - Elected faculty representative on the Board of Directors
- **2015–2021** - Elected faculty representative on the Education Council

Publications

Journal Articles

1.

Structure-preserving space discretization of differential and nonlocal constitutive relations for port-Hamiltonian systems

Bendimerad-Hohl Antoine, Haine Ghislain, Lefèvre Laurent, Matignon Denis

DOI: 10.1016/j.jcp.2026.114951

Bendimerad-Hohl Antoine, Haine Ghislain, Lefèvre Laurent, Matignon Denis (2026) *Structure-preserving space discretization of differential and nonlocal constitutive relations for port-Hamiltonian systems*. Journal of Computational Physics; X(X):PP–PP
2.

Port-Hamiltonian reduced order modelling of the 2D Maxwell equations

Gouzien Mattéo, Poussot-Vassal Charles, Haine Ghislain, Matignon Denis

DOI: 10.1108/compel-10-2024-0421

Gouzien Mattéo, Poussot-Vassal Charles, Haine Ghislain, Matignon Denis (2025) *Port-Hamiltonian reduced order modelling of the 2D Maxwell equations*. COMPEL - The international journal for computation and mathematics in electrical and electronic engineering; 45(3):389–411
3.

Stokes-Lagrange and Stokes-Dirac representations of N-dimensional port-Hamiltonian systems for modeling and control

Bendimerad-Hohl Antoine, Haine Ghislain, Lefèvre Laurent, Matignon Denis

DOI: 10.3934/cam.2025020

Bendimerad-Hohl Antoine, Haine Ghislain, Lefèvre Laurent, Matignon Denis (2025) *Stokes-Lagrange and Stokes-Dirac representations of (N) -dimensional port-Hamiltonian systems for modeling and control*. Communications in Analysis and Mechanics; 17(2):474–519
- 4.

Rotational shallow water equations with viscous damping and boundary control: structure-preserving spatial discretization

Cardoso-Ribeiro Flávio Luiz, Haine Ghislain, Lefèvre Laurent, Matignon Denis

DOI: 10.1007/s00498-024-00404-6

Cardoso-Ribeiro Flávio Luiz, Haine Ghislain, Lefèvre Laurent, Matignon Denis (2025) *Rotational shallow water equations with viscous damping and boundary control: structure-preserving spatial discretization*. Mathematics of Control, Signals, and Systems; 37(2):361–394

5.

Port-Hamiltonian formulations for the modeling, simulation and control of fluids

Cardoso-Ribeiro Flávio Luiz, Haine Ghislain, Le Gorrec Yann, Matignon Denis, Ramirez Hector

DOI: 10.1016/j.compfluid.2024.106407

Cardoso-Ribeiro Flávio Luiz, Haine Ghislain, Le Gorrec Yann, Matignon Denis, Ramirez Hector (2024) *Port-Hamiltonian formulations for the modeling, simulation and control of fluids*. Computers & Fluids; 283:106407

6.

Stokes-Dirac structures for distributed parameter port-Hamiltonian systems: An analytical viewpoint

Brugnoli Andrea, Haine Ghislain, Matignon Denis

DOI: 10.3934/cam.2023018

Brugnoli Andrea, Haine Ghislain, Matignon Denis (2023) *Stokes-Dirac structures for distributed parameter port-Hamiltonian systems: An analytical viewpoint*. Communications in Analysis and Mechanics; 15(3):362–387

7.

Numerical Analysis of a Structure-Preserving Space-Discretization for an Anisotropic and Heterogeneous Boundary Controlled N-Dimensional Wave Equation as a Port-Hamiltonian System

Haine Ghislain, Matignon Denis, Serhani Anass

DOI: 10.4208/ijnam2023-1005

Haine Ghislain, Matignon Denis, Serhani Anass (2023) *Numerical Analysis of a Structure-Preserving Space-Discretization for an Anisotropic and Heterogeneous Boundary Controlled (N) -Dimensional Wave Equation as a Port-Hamiltonian System*. International Journal of Numerical Analysis and Modeling; 20(1):92–133

8.

Long-time behavior of a coupled heat-wave system using a structure-preserving finite element method

Haine Ghislain, Matignon Denis, Monteghetti Florian

Haine Ghislain, Matignon Denis, Monteghetti Florian (2022) *Long-time behavior of a coupled heat-wave system using a structure-preserving finite element method*. Mathematical Reports; 24(1-2):1–29

9.

Numerical Approximation of Port-Hamiltonian Systems for Hyperbolic or Parabolic PDEs with Boundary Control

Brugnoli Andrea, Haine Ghislain, Serhani Anass, Vasseur Xavier

DOI: 10.4236/jamp.2021.96088

Brugnoli Andrea, Haine Ghislain, Serhani Anass, Vasseur Xavier (2021) *Numerical Approximation of Port-Hamiltonian Systems for Hyperbolic or Parabolic PDEs with Boundary Control*. Journal of Applied Mathematics and Physics; 9(6):1278–1321

10.

Asymptotic stability of the multidimensional wave equation coupled with classes of positive-real impedance boundary conditions

Monteghetti Florian, Haine Ghislain, Matignon Denis

DOI: 10.3934/mcrf.2019049

Monteghetti Florian, Haine Ghislain, Matignon Denis (2019) *Asymptotic stability of the multidimensional wave equation coupled with classes of positive-real impedance boundary conditions*. *Mathematical Control and Related Fields*; 9(4):759–791

11.

Recovering the observable part of the initial data of an infinite-dimensional linear system with skew-adjoint generator

Haine Ghislain

DOI: 10.1007/s00498-014-0124-z

Haine Ghislain (2014) *Recovering the observable part of the initial data of an infinite-dimensional linear system with skew-adjoint generator*. *Mathematics of Control, Signals, and Systems*; 26(3):435–462

12.

Observateurs itératifs en horizon fini. Application à la reconstruction de données initiales pour des EDP d'évolution

Haine Ghislain, Ramdani Karim

DOI: 10.3166/jesa.45.715-724

Haine Ghislain, Ramdani Karim (2011) *Observateurs itératifs en horizon fini. Application à la reconstruction de données initiales pour des EDP d'évolution*. *Journal Européen des Systèmes Automatisés*; 45(7–10):715–724

13.

Reconstructing initial data using observers: error analysis of the semi-discrete and fully discrete approximations

Haine Ghislain, Ramdani Karim

DOI: 10.1007/s00211-011-0408-x

Haine Ghislain, Ramdani Karim (2012) *Reconstructing initial data using observers: error analysis of the semi-discrete and fully discrete approximations*. *Numerische Mathematik*; 120(2):307–343

Conference Papers

1.

On Stokes-Lagrange and Stokes-Dirac representations for 1D distributed port-Hamiltonian systems

Bendimerad-Hohl Antoine, Matignon Denis, Haine Ghislain, Lefèvre Laurent

DOI: 10.1016/j.ifacol.2024.10.174

Bendimerad-Hohl Antoine, Matignon Denis, Haine Ghislain, Lefèvre Laurent (2024) *On Stokes-Lagrange and Stokes-Dirac representations for 1D distributed port-Hamiltonian systems*. *IFAC-PapersOnLine* 58(17):238–243. Cambridge, United Kingdom.

2.

Data-driven structured identification of 2D Maxwell's equation as a port-Hamiltonian system

Gouzien Mattéo, Poussot-Vassal Charles, Haine Ghislain, Matignon Denis

Gouzien Mattéo, Poussot-Vassal Charles, Haine Ghislain, Matignon Denis (2024) *Data-driven structured identification of 2D Maxwell's equation as a port-Hamiltonian system*. In the proceedings of the 10ème Conférence Européenne sur les Méthodes Numériques en Electromagnétisme. Toulouse, France.

3.
Simulation and control of interactions in multi-physics, a Python package for port-Hamiltonian systems
Ferraro Giuseppe, Fournié Michel, Haine Ghislain
DOI: 10.1016/j.ifacol.2024.08.267
Ferraro Giuseppe, Fournié Michel, Haine Ghislain (2024) *Simulation and control of interactions in multi-physics, a Python package for port-Hamiltonian systems*. IFAC-PapersOnLine 58(6):119–124. Besançon, France.
4.
Modelling and Structure-Preserving Discretization of the Schrödinger as a Port-Hamiltonian System, and Simulation of a Controlled Quantum Box
Verrier Gabriel, Haine Ghislain, Matignon Denis
DOI: 10.1007/978-3-031-38299-4_41
Verrier Gabriel, Haine Ghislain, Matignon Denis (2023) *Modelling and Structure-Preserving Discretization of the Schrödinger as a Port-Hamiltonian System, and Simulation of a Controlled Quantum Box*. In: Geometric Science of Information. GSI 2023. Lecture Notes in Computer Science; 14072:392–401. Springer, Cham. St. Malo, France.
5.
Structure-preserving Discretization of the Cahn-Hilliard Equations Recast as a Port-Hamiltonian System
Bendimerad-Hohl Antoine, Haine Ghislain, Matignon Denis
DOI: 10.1007/978-3-031-38299-4_21
Bendimerad-Hohl Antoine, Haine Ghislain, Matignon Denis (2023) *Structure-preserving Discretization of the Cahn-Hilliard Equations Recast as a Port-Hamiltonian System*. In: Geometric Science of Information. GSI 2023. Lecture Notes in Computer Science; 14072:192–201. Springer, Cham. St. Malo, France.
6.
Implicit port-Hamiltonian systems: structure-preserving discretization for the nonlocal vibrations in a viscoelastic nanorod, and for a seepage model
Bendimerad-Hohl Antoine, Haine Ghislain, Lefèvre Laurent, Matignon Denis
DOI: 10.1016/j.ifacol.2023.10.387
Bendimerad-Hohl Antoine, Haine Ghislain, Lefèvre Laurent, Matignon Denis (2023) *Implicit port-Hamiltonian systems: structure-preserving discretization for the nonlocal vibrations in a viscoelastic nanorod, and for a seepage model*. IFAC-PapersOnLine 56(2):6789–6795. Yokohama, Japan.
7.
Data-driven port-Hamiltonian structured identification for non-strictly passive systems
Poussot-Vassal Charles, Matignon Denis, Haine Ghislain, Vuillemin Pierre
DOI: 10.23919/ecc57647.2023.10178249
Poussot-Vassal Charles, Matignon Denis, Haine Ghislain, Vuillemin Pierre (2023) *Data-driven port-Hamiltonian structured identification for non-strictly passive systems*. In the proceedings of the 2023 European Control Conference; 1785–1790. Bucharest, Romania.
8.
Explicit structure-preserving discretization of port-Hamiltonian systems with mixed boundary control
Brugnoli Andrea, Haine Ghislain, Matignon Denis
DOI: 10.1016/j.ifacol.2022.11.089
Brugnoli Andrea, Haine Ghislain, Matignon Denis (2022) *Explicit structure-preserving discretization of port-Hamiltonian systems with mixed boundary control*. IFAC-PapersOnLine 55(30):418–423. Bayreuth, Germany.

- 9.
- Structure-preserving discretization of Maxwell's equations as a port-Hamiltonian system**
Haine Ghislain, Matignon Denis, Monteghetti Florian
DOI: 10.1016/j.ifacol.2022.11.090
- Haine Ghislain, Matignon Denis, Monteghetti Florian (2022) *Structure-preserving discretization of Maxwell's equations as a port-Hamiltonian system*. IFAC-PapersOnLine 55(30):424–429. Bayreuth, Germany.
- 10.
- Structure-preserving discretization of a coupled Allen-Cahn and heat equation system**
Bendimerad-Hohl Antoine, Haine Ghislain, Matignon Denis, Maschke Bernhard
DOI: 10.1016/j.ifacol.2022.08.037
- Bendimerad-Hohl Antoine, Haine Ghislain, Matignon Denis, Maschke Bernhard (2022) *Structure-preserving discretization of a coupled Allen-Cahn and heat equation system*. IFAC-PapersOnLine 55(18):99–104. Montreal, Canada.
- 11.
- Incompressible Navier-Stokes Equation as port-Hamiltonian systems: velocity formulation versus vorticity formulation**
Haine Ghislain, Matignon Denis
DOI: 10.1016/j.ifacol.2021.11.072
- Haine Ghislain, Matignon Denis (2018) *Incompressible Navier-Stokes Equation as port-Hamiltonian systems: velocity formulation versus vorticity formulation*. IFAC-PapersOnLine 54(19):161–166. Berlin, Germany.
- 12.
- Structure-Preserving Discretization of a Coupled Heat-Wave System, as Interconnected Port-Hamiltonian Systems**
Haine Ghislain, Matignon Denis
DOI: 10.1007/978-3-030-80209-7_22
- Haine Ghislain , Matignon Denis (2021) *Structure-Preserving Discretization of a Coupled Heat-Wave System, as Interconnected Port-Hamiltonian Systems*. In: Geometric Science of Information. GSI 2021. Lecture Notes in Computer Science; 12829:191–199. Springer, Cham. Paris, France.
- 13.
- Modelling the 1D piston problem as interconnected port-Hamiltonian systems**
Treton Anne-Sophie, Haine Ghislain, Matignon Denis
DOI: 10.1016/j.ifacol.2020.12.601
- Treton Anne-Sophie, Haine Ghislain, Matignon Denis (2020) *Modelling the 1D piston problem as interconnected port-Hamiltonian systems*. IFAC-PapersOnLine 53(2):11503–11508. Berlin, Germany.
- 14.
- Partitioned finite element method for structured discretization with mixed boundary conditions**
Brugnoli Andrea, Cardoso-Ribeiro Flávio Luiz, Haine Ghislain, Kotyczka Paul
DOI: 10.1016/j.ifacol.2020.12.1351
- Brugnoli Andrea, Cardoso-Ribeiro Flávio Luiz, Haine Ghislain, Kotyczka Paul (2020) *Partitioned finite element method for structured discretization with mixed boundary conditions*. IFAC-PapersOnLine 53(2):7557–7562. Berlin, Germany.
- 15.

Modelling and structure-preserving discretization of Maxwell's equations as port-Hamiltonian system

Payen Gabriel, Matignon Denis, Haine Ghislain

DOI: 10.1016/j.ifacol.2020.12.1355

Payen Gabriel, Matignon Denis, Haine Ghislain (2020) *Modelling and structure-preserving discretization of Maxwell's equations as port-Hamiltonian system*. IFAC-PapersOnLine 53(2):7581–7586. Berlin, Germany.

16.

A Partitioned Finite Element Method for the Structure-Preserving Discretization of Damped Infinite-Dimensional Port-Hamiltonian Systems with Boundary Control

Serhani Anass, Matignon Denis, Haine Ghislain

DOI: 10.1007/978-3-030-26980-7_57

Serhani Anass, Matignon Denis, Haine Ghislain (2019) *A Partitioned Finite Element Method for the Structure-Preserving Discretization of Damped Infinite-Dimensional Port-Hamiltonian Systems with Boundary Control*. In: Geometric Science of Information. GSI 2019. Lecture Notes in Computer Science; 11712:549–558. Springer, Cham. Toulouse, France.

17.

Anisotropic heterogeneous n-D heat equation with boundary control and observation: I. Modeling as port-Hamiltonian system

Serhani Anass, Haine Ghislain, Matignon Denis

DOI: 10.1016/j.ifacol.2019.07.009

Serhani Anass, Haine Ghislain, Matignon Denis (2019) *Anisotropic heterogeneous n-D heat equation with boundary control and observation: I. Modeling as port-Hamiltonian system*. IFAC-PapersOnLine 52(7):51–56. Louvain-la-Neuve, Belgium.

18.

Anisotropic heterogeneous n-D heat equation with boundary control and observation: II. Structure-preserving discretization

Serhani Anass, Haine Ghislain, Matignon Denis

DOI: 10.1016/j.ifacol.2019.07.010

Serhani Anass, Haine Ghislain, Matignon Denis (2019) *Anisotropic heterogeneous n-D heat equation with boundary control and observation: II. Structure-preserving discretization*. IFAC-PapersOnLine 52(7):57–62. Louvain-la-Neuve, Belgium.

19.

Partitioned Finite Element Method for port-Hamiltonian systems with Boundary Damping: Anisotropic Heterogeneous 2D wave equations

Serhani Anass, Matignon Denis, Haine Ghislain

DOI: 10.1016/j.ifacol.2019.08.017

Serhani Anass, Matignon Denis, Haine Ghislain (2019) *Partitioned Finite Element Method for port-Hamiltonian systems with Boundary Damping: Anisotropic Heterogeneous 2D wave equations*. IFAC-PapersOnLine 52(2):96–101. Oaxaca, Mexico.

20.

Numerical Simulation on a Fixed Mesh for the Feedback Stabilization of a Fluid–Structure Interaction System with a Structure Given by a Finite Number of Parameters

Delay Guillaume, Ervedoza Sylvain, Fournié Michel, Haine Ghislain

DOI: 10.1007/978-3-030-55594-8_19

Delay Guillaume, Ervedoza Sylvain, Fournié Michel, Haine Ghislain (2021) *Numerical Simulation on a Fixed Mesh for the Feedback Stabilization of a Fluid-Structure Interaction System with a Structure Given by a Finite Number of Parameters*. In: Advances in Critical Flow Dynamics Involving Moving/Deformable Structures with Design Applications. Notes on Numerical Fluid Mechanics and Multidisciplinary Design; 147:195–211. Springer, Cham. Santorini, Greece.

21.

Structure-Preserving Finite Volume Method for 2D Linear and Non-Linear Port-Hamiltonian Systems

Serhani Anass, Matignon Denis, Haine Ghislain

DOI: 10.1016/j.ifacol.2018.06.037

Serhani Anass, Matignon Denis, Haine Ghislain (2018) *Structure-Preserving Finite Volume Method for 2D Linear and Non-Linear Port-Hamiltonian Systems*. IFAC-PapersOnLine 51(3):131–136. Valparaiso, Chile.

22.

Stability of Linear Fractional Differential Equations with Delays: a coupled Parabolic-Hyperbolic PDEs formulation

Monteghetti Florian, Haine Ghislain, Matignon Denis

DOI: 10.1016/j.ifacol.2017.08.1966

Monteghetti Florian, Haine Ghislain, Matignon Denis (2017) *Stability of Linear Fractional Differential Equations with Delays: a coupled Parabolic-Hyperbolic PDEs formulation*. IFAC-PapersOnLine 50(1):13282–13288. Toulouse, France.

23.

Closed-loop perturbations of well-posed linear systems

Haine Ghislain

DOI: 10.1016/j.ifacol.2017.08.729

Haine Ghislain (2017) *Closed-loop perturbations of well-posed linear systems*. IFAC-PapersOnLine 50(1):4546–4551. Toulouse, France.

24.

Recovering the observable part of the initial data of an infinite-dimensional linear system with perturbed skew-adjoint generator using observers

Haine Ghislain

DOI: 10.1109/ecc.2015.7330722

Haine Ghislain (2015) *Recovering the observable part of the initial data of an infinite-dimensional linear system with perturbed skew-adjoint generator using observers*. In the proceedings of the 2015 European Control Conference; 1327–1332. Linz, Austria.

25.

An observer-based approach for thermoacoustic tomography

Haine Ghislain

Haine Ghislain (2014) *An observer-based approach for thermoacoustic tomography*. In the proceedings of the 21st International Symposium on Mathematical Theory of Networks and Systems. Groningen, The Netherlands.

26.

Reconstructing initial data using iterative observers for wave type systems

Haine Ghislain

Haine Ghislain (2013) *Reconstructing initial data using iterative observers for wave type systems*. In the proceedings of the 11th International Conference on Mathematical and Numerical Aspects of Waves. Gammarth, Tunisia.

27.

Reconstructing initial data using iterative observers for wave type systems. A numerical analysis

Haine Ghislain, Ramdani Karim

Haine Ghislain, Ramdani Karim (2011) *Reconstructing initial data using iterative observers for wave type systems. A numerical analysis*. In the proceedings of the 10th International Conference on Mathematical and Numerical Aspects of Waves. Vancouver, Canada.