

Stéphanie CHAILLAT-LOSEILLE

36 years

French citizenship

Married, two sons (2011 and 2014)

POEMS (UMR 7231)

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RESEARCH SCIENTIST (CRCN CNRS)

(updated September 2019)

Professional Experience

2015-... **Research Scientist (CR1 CNRS/ CRCN CNRS, section 9)**, POEMS, ENSTA Paristech, Palaiseau, France.

2010-2014 **Research Scientist (CR2 CNRS, section 9)**, POEMS, ENSTA Paristech, Palaiseau, France.

2009-2010 **Post-doc** with Associate Professor George Biros, College of Computing, Computational Science and Engineering Division, Georgia Tech, Atlanta, USA.

Topic: Computational and theoretical aspects on inverse problems for acoustic scattering.

Degrees

2019 **HDR**, ENS Paris-Saclay, France.

2008 **PhD in Computational Mechanics**, École Nationale des Ponts et Chaussées, France.

Title: "Fast Multipole Method for boundary element method in 3D elastodynamics. Application to seismic wave propagation".

Advisors: Prof. M. Bonnet and Prof. JF. Semblat.

2005 **MSc in Mathematics (DEA)**, École Normale Supérieure Lyon, France.

Engineering degree, École Nationale des Travaux Publics de l'État, Vaulx en Velin, France.

Specialty: advanced scientific methods in civil engineering

2004 **BS in Mathematics (Licence)**, Université Lyon I, France.

2002 **Two year university degree in Mathematics (DEUG)**, Université Bordeaux I, France.

Awards

2009 **National PhD Award** from the French Computational Mechanics Association (CSMA).

2009 **European PhD Award** from the European Community on Computational Methods in Applied Sciences (ECCOMAS).

Teaching

2019- **Boundary element methods**, ENTPE, Vaulx en Velin, France.

2019- **Introduction to Algorithmics**, ENSTA, Palaiseau, France.

2017- **Introduction to Linux**, ENSTA, Palaiseau, France.

2016-2018 **Introduction to the Finite Element Method**, ENSTA, Palaiseau, France.

2015- **Boundary Element Methods**, Ecole Doctorale Sciences, Ingénierie et Environnement, Université Paris Est, France.

2015- **Fast methods to solve Boundary Integral Equations for time harmonic scattering problems**, ENSTA, Palaiseau, France.

2012-2018 **Functions of one complex variable**, ENSTA, Palaiseau, France.

2011- **Introduction to PDEs and their approximations**, ENSTA, Palaiseau, France.

Grants, Contracts and Participation to projects

2018-2022 **Contribution to projet: "Modeling lOng-perioD groUnd motions, and assessment of their effects on Large-scale infrAsStructurEs " funded by the (French) National Agency for Research.**

Project goals: the MODULATE project is concerned with the analysis and modeling of long period motions and their effects on large-scale infrastructures such as high-rise buildings, liquid-storage tanks and long-span bridges.

2018 **Grant from DGA-** Directorate General of Armaments- to fund the Post-doc work of F. Amlani on Fast BEMs.

2018-2020 **Co-PI of Industrial Contract with Naval Group** (contact: B. Leblé).

2016-2019 **Contribution to projet: "Non Local Domain Decomposition Methods in Electromagnetics" funded by the (French) National Agency for Research.**

2013-2016 **Co-PI of Industrial Contract with EDF** (contact: A. Nietto-Ferro).

2013-2016 **PI of Industrial Contract with Shell** (contact: R.E. Plessix and collaboration with J. Virieux, ISTERRE).

2013-2016 **Contribution to projet: "Robustness, automation and reliability of integral formulations for wave propagation: a posteriori estimators and adaptivity" funded by the (French) National Agency for Research.**

Project goals: the RAFFINE project involves the development of a posteriori estimators and adaptive methods for integral equations in the field of simulation of acoustic, electromagnetic and elastic waves.

2012 **Grant for participation of young researchers in international conferences** from the French Mechanics Association(AFM) and the French National Committee of Mechanics (CNFM).

2005-2008 **Contribution to projet: "Quantitative Seismic Hazard Assessment" funded by the (French) National Agency for Research.**

Project goals: to obtain a better description of crustal structures, improve the source characterization and the determination of earthquake scenarios, develop more precise modelling of seismic waves, improve empirical and semi-empirical techniques based on observed data, and obtain a quantitative estimation of ground motion based on previous information.

Post-doc supervision

- Jan. 2020 - **Sara Touhami** (with J.F. Semblat).
Oct. 2017-Sept 2019 **Félix Kpadonou**, Preconditioning of fast BEMs (with P. Ciarlet, now at CGG).
Nov. 2016-Dec. 2018 **Faisal Amlani**, Adaptive Fast Multipole Boundary Element Method (with A. Loiseille, now visiting Research Scholar at University of South California).
Nov. 2015- Nov. 2016 **Samuel Groth**, Adaptive Fast Multipole Boundary Element Method (with A. Loiseille, now post-doc at Cambridge).

PhD student supervision

- Oct. 2017- **Damien Mavaleix-Marchessoux**, Modelling the fluid-structure interaction between water and a submarine caused by a far-away underwater explosion (Granted by Naval Group; co-advisor M. Bonnet).
Dec. 2014-May 2018 **Zouhaïr Adnani**, Fast Multipole Boundary Element Method for site effects and soil-structure interactions (Granted by EDF; co-advisor M. Bonnet; now engineer at SNCF).
Oct. 2013-Jan. 2017 **Luca Desiderio**, Efficient visco-elastic wave propagation in 3D for high-contrast media (Granted by Shell; co-advisor P. Ciarlet; now post-doc at Politecnico di Torino).
Oct. 2013- Oct. 2016 **Marc Bakry**, Development of error estimates for the Boundary Integral Equations (Funded by ANR; co-advisor P. Ciarlet but principal advisor S. Pernet; now post-doc at INRIA).

Master student supervision

- May-July 2019 **Runze Feng**, Acoustic response of a non-linear vibrating structure.
May-Aug. 2019 **Nassim Kesmia**, Preconditioning of 2D Boundary Element Methods.
March-Sept. 2018 **Maria José Castellano**, A comparison of Boundary Element Methods for Time-Harmonic Wave Propagation.
May-Sept. 2017 **Anas El Mendili**, Fluid-structure coupling with BEMs.
April-Sept. 2017 **Damien Mavaleix-Marchessoux**, Modelling the fluid-structure interaction between water and a submarine caused by a far-away underwater explosion.
April-Sept. 2017 **Khawla Gannoun**, Algorithmic of H-matrices for 3D acoustic problems.
May-July 2016 **Shashank Anand**, Parallelization of a Fast direct solver for 3D elastodynamic Boundary Element Method in the frequency domain.
March-July 2016 **Aurore Texier**, \mathcal{H} -matrix based direct solver for 3D Anisotropic Elastodynamics.
April-Sept. 2013 **Aditya Vangal Vasudevan**, Coupling the Fast Multipole Boundary Element Method and the Finite Element Method for 3D visco-elastodynamics.
Feb.-Sept. 2012 **Eric Lefebvre**, Preconditioning of the Fast Multipole Boundary Element Method.
Pierre Blanchard, Fast Multipole Boundary Element Method for soil-structure interactions.
April-Sept. 2008 **Régis Bost**, Fast Multipole Boundary Element Method for 3D visco-elastodynamics.
April-July 2007 **Cédric Bellis**, Fast Multipole Boundary Element Method for 3D cracks.

Participation to PhD defense comitees

- July 2019 **Sijia Li**, INSA Lyon, France (reviewer).
June 2018 **Boris Caudron**, Université de Lorraine, France.

Academic visits

- Feb. 2019 One week visit at the University College London, Center for Inverse Problems.
March- Invited core participant at the Institute for Pure and Applied Mathematics (IPAM) of UCLA
June 2017 for a three month long program on "Computational Issues in Oil Field Applications" (funded by NSF), Los Angeles, USA.
July 2016 Two weeks visit at Stanford University, Institute for Computational and Mathematical Engineering.
Oct. 2015 One week visit at the University of Texas at Austin, ICES.
Feb. 2014 One week visit at the University of Parma, Department of Mathematics.
Feb. 2013 One week visit at the University of Texas at Austin, ICES.
April 2012 One week visit at the University of Texas at Austin, ICES.
June 2011 One week visit at the University of Parma, Department of Mathematics.

Skills

- Mechanics** Computational solid mechanics.
Elastodynamics in frequency domain. Viscoelasticity.
Acoustics in frequency domain.
Wave propagation.
- Seismology** Seismic wave propagation.
Site effects (seismic wave amplification in alluvial valleys) .
- Numerical Methods** Boundary integral equations and Boundary element method.
Fast multipole method and Fast evaluation of Green's Tensors.
Iterative solvers and Preconditioning.
Fast Singular Value Decomposition and Low-rank approximations.
 \mathcal{H} - matrices and Direct solvers.
Inverse problems.
- Computer Science** System: Unix, Linux, Mac OS X and Windows.
Programming: Fortran 90 and Shell Script. Basic knowledges of C/C++, Python and OpenMP.
Softwares: \LaTeX , Maple, Matlab, Mathematica, Xmgrace, Word and Excel.
Scientific Softwares: Mesh generator and adaptation (YAMS, Feflo.a) and visualisation tool (MEDIT, VIZIR).
- Language** English: fluent.
Spanish: student level.

COFFEE 3D fast BEM solver for linear acoustic and (visco)-elastodynamics (Fortran 90, main developer). First Registration at the APP in 2013 under number. IDDN.FR.001.250012.000.S.P.2015.000.31235. This software is used to capitalize all my research on fast solvers for wave propagation problems. The 3-D acoustic and elastodynamic equations are solved with the boundary element method accelerated by the multi-level fast multipole method or hierarchical matrices, depending on the nature of the problem. The full-space fundamental solutions are mainly used but the half-space fundamental solutions are also available. A boundary element-boundary element coupling strategy is also implemented so multi-region problems (strata inside a valley for example) can be solved. To speed-up further the solver, various analytic or algebraic preconditioners are available. In addition, a mesh adaptation strategy is proposed to improve the convergence with respect to the number of degrees of freedom and deal with complex geometries. The frequency-domain formulation is used but time-domain results are also available by Fast Fourier Transform or Convolution Quadrature Method. To simplify the usage, a Python interface is under development.

The code has shown its efficiency in various domains, e.g., to study acoustic diffraction problems, red blood cell aggregation, site-effects, soil-structure interactions, seismic cycles, hydraulic fracture or to compute numerical fundamental solutions.

FaIMS Fast Approximate Inverse Medium Solver (Matlab). The inverse problem is formulated with a Lippmann-Schwinger integral equation (Born Approximation). We use a SVD to solve the 3-D inverse problem. The direct computation of the SVD would be too expensive if a lot of data needs to be combined. We have proposed a method based on the coupling of a randomized SVD and a recursive SVD to reduce CPU time and memory requirements.

Collective responsibilities

2019-	Participation to the management of GDR Ondes , Workpackage Modeling and Simulation
2017-	Member of the scientific committee of the 13th French National Conference on Computational Structural Mechanics
2016-2018	Chair of the IABEM 2018 conference in Paris (140 participants in June 2018)
2016-...	Correspondent of of the lab for the Agency for Interaction in Mathematics with Business and Society (AMIES)
2015-...	Representative of the lab for the Working Group on HPC (Department Mechanical, Energy and Process Engineering, Université Paris Saclay)
11/2013	Expert for Fonds national suisse de la recherche scientifique
10/2012-09/2018	Organizer of the monthly Internal POEMS Seminar (two invited speakers)
2007-2008	Coordinator of the LMS PhD students seminar
2007-2008	Representative of PhD students in LMS laboratory council

Organization	Co-organizer BIRS Workshop on "Outstanding Challenges in Computational Methods for Integral Equations" with A. Gillman, M. O'Neil, P.G. Martinsson, June 2020. Co-organizer Oberwolfach Workshop on "Boundary Element Methods" with R. Hiptmair, J.F. Sayas, O. Steinbach, February 2020. Mini-symposium "Modern fast Boundary Element formulations for wave propagation problems" with M. Schanz (Waves 2019, Vienna). Chair of the IABEM 2018 conference with X. Claeys. Mini-symposium "Accurate and Fast Numerical Solvers for Large-scale Wave Propagation Problems" with A. Modave, J. Chan and A. Gillman (13th World Congress on Computational Mechanics, 2018, New York). First Paris-London BEM Workshop with T. Betcke, London, UK, June 2017. Mini-symposium "3D Elastic waveform inversion: challenges in modeling and inversion" with L. Metivier (SIAM Geosciences 2015, Stanford University). Mini-symposium "Fast direct solvers: applications to boundary element methods and other linear systems" with E. Darve and M. Schanz (WCCM 2014, Barcelona) Participation to Organization: Journée Ondes et problèmes inverses en géophysique (IHP, 09/2013) Workshop on Error Estimates and Adaptive Mesh Refinement Strategies for Boundary Element Methods (ENSTA, 05/2013) Mini-symposium "Fast Algorithms for Inverse Scattering" with George Biros (ECCM 2010, Paris)
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Refereeing:	"BIT Numerical Mathematics", "Communications in Computational Physics", "Computational Mechanics", "Computer Methods in Applied Mechanics and Engineering", "Engineering Analysis with Boundary Elements", "Geophysics", "Geophysical Journal International", "Journal of Computational and Applied Mathematics", "Journal of Sound and Vibration", "Mathematical Methods in the Applied Sciences", "Journal of Computational Physics", "Journal of Engineering Mechanics", "SIAM Journal on Numerical Analysis", "SIAM Journal on Applied Mathematics", "SIAM Journal in Scientific Computing" and "Soil Dynamics and Earthquake Engineering", ...
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Scientific Dissimination

2013	Contribution to the french blog MPT2013 dedicated to "2013 Mathematics of the Planet Earth" .
2013	Participation to the project Bookmark from the association S[cube].

Bibliography

- [1] Z. ADNANI, V. ALVES FERNANDES, M. BONNET, S. CHAILLAT, AND G. DEVESA. Fast Multipole Boundary Element Method for site effects and soil-structure interactions. *In preparation*.
- [2] F. AMLANI, S. CHAILLAT, AND A. LOSEILLE, Metric-based anisotropic mesh adaptation for high-order boundary element methods in acoustic scattering. *In preparation*.
- [3] P. ROMANET, H. S. BHAT, S. CHAILLAT, R. MADARIAGA, Fast algorithms to model quasi-dynamic earthquake cycles in complex fault networks. *To be Submitted to J. Geophys. Res.*
- [4] S. CHAILLAT, P. CIARLET, AND F. KPADONOU, On the efficiency of nested GMRES preconditioners for 3D acoustic and elastodynamic \mathcal{H} -matrix accelerated Boundary Element Methods. *Submitted*.
- [5] F. AMLANI, S. CHAILLAT, A. LOSEILLE, An efficient preconditioner for adaptive Fast Multipole accelerated Boundary Element Methods to model time-harmonic 3D wave propagation. *CMAME*, Vol. 352, 189-210, 2019.
- [6] S. CHAILLAT, S. GROTH, A. LOSEILLE, Metric-based anisotropic mesh adaptation for 3D acoustic boundary element methods. *Journal of Computational Physics*, Vol. 372, 473-499, 2018.
- [7] S. CHAILLAT, L. DESIDERIO, P. CIARLET, Theory and implementation of H-matrix based iterative and direct solvers for Helmholtz and elastodynamic oscillatory kernels. *Journal of Computational Physics*, Vol. 351, 165-186, 2017.
- [8] S. CHAILLAT, M. DARBAS, F. LE LOUËR, Fast iterative boundary element methods for high-frequency scattering problems in 3D elastodynamics. *Journal of Computational Physics*, Vol. 341, 429-446, 2017.
- [9] K. MEZA-FAJARDO, J.F. SEMBLAT, S. CHAILLAT AND L. LENTI, Seismic Wave Amplification in 3D Alluvial Basins: 3D/1D Amplification Ratios from Fast Multipole BEM Simulations. *Bulletin of the Seismological Society of America*, Vol. 106, 1267-1281, 2016.
- [10] S. CHAILLAT, M. DARBAS, F. LE LOUËR, Approximate local Dirichlet-to-Neumann map for three-dimensional elastic waves. *Computer Methods in Applied Mechanics and Engineering*, Vol. 297, 62-83, 2015.
- [11] S. CHAILLAT, F. COLLINO, A Wideband Fast Multipole Method for the Helmholtz Kernel: Theoretical Developments. *Computers and Mathematics with Applications*, Vol. 70, 660-678, 2015.
- [12] S. CHAILLAT, M. BONNET, A new Fast Multipole formulation for the Elastodynamic Half-Space Green's tensor. *Journal of Computational Physics*, Vol. 258, 787-808, 2014.
- [13] S. CHAILLAT, M. BONNET, Recent advances on the Fast Multipole Accelerated Boundary Element Method for 3-D time-harmonic elastodynamics. *Wave Motion (Special Issue: Modeling of Waves in Solid)*, Vol. 50, 1090-1104, 2013.
- [14] S. CHAILLAT, G. BIROS, FaIMS: A fast algorithm for the inverse medium problem with multiple frequencies and multiple sources for the scalar Helmholtz equation. *Journal of Computational Physics*, Vol. 231, 4403-4421, 2012.
- [15] E. GRASSO, S. CHAILLAT, M. BONNET, J.-F. SEMBLAT, Application of the multi-level time-harmonic fast multipole BEM to 3-D visco-elastodynamics. *Engineering Analysis with Boundary Elements*, Vol. 36, 744-758, 2012.
- [16] S. CHAILLAT, J.F. SEMBLAT, M. BONNET, A preconditioned 3-D multi-region fast multipole solver for seismic wave propagation in complex geometries. *Communications in Computational Physics (special issue WAVES 2009)*, Vol. 11, 594-609, 2012.
- [17] H.D. BUI, S. CHAILLAT, A. CONSTANTINESCU, E. GRASSO, Identification of a planar crack in Zener type viscoelasticity. *Annals of Solid and Structural Mechanics*, Vol. 1, 3-8, 2010.
- [18] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A new fast multi-domain BEM to model seismic wave propagation and amplification in 3D geological structures. *Geophys. J. Int.*, 177: 509-531, 2009.
- [19] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A Fast Multipole accelerated BEM for 3-D elastic wave computation. *Eur. J. Comp. Mech.*, 17: 701-712, 2008.
- [20] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A multi-level Fast Multipole BEM for 3-D elastodynamics in the frequency domain. *Computer Methods in Applied Mechanics and Engineering*, 197: 4233-4249, 2008.
- [21] S. CHAILLAT, H.D. BUI, Resolution of linear viscoelastic equations in the frequency domain using real Helmholtz boundary integral equations. *C. R. Mecanique*, 335: 746-750, 2007.
- [22] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A Fast Multipole Method formulation for 3D elastodynamics in the frequency domain. *C. R. Mecanique*, 335: 714-719, 2007.

Book chapter

- [23] M. BONNET, S. CHAILLAT, J.F. SEMBLAT, Multi-level fast multipole BEM for 3-D elastodynamics. *In Recent Advances in BEM* (D. Polyzos and G. Manolis, eds.), 2009.

Thesis

- [24] S. CHAILLAT, Contributions to the modelling of acoustic and elastic wave propagation in large-scale domains with boundary element methods, HDR, ENS Paris-Saclay, 2019.
- [25] S. CHAILLAT, Fast Multipole Method (FMM) for boundary element method in 3D elastodynamics. Application to seismic wave propagation, PhD Thesis, ENPC, 2008.

Conferences

- [26] S. CHAILLAT, Quelques méthodes (complémentaires) pour accélérer la résolution de la méthode des éléments de frontière pour les ondes élastiques. In *GDR Ondes*, Palaiseau, France, October 2019 (Invited).
- [27] S. CHAILLAT, F. AMLANI, A. LOSEILLE, Recent developments on adaptive fast Boundary Element Methods to model elastic wave propagation in sedimentary basin. In *MAFELAP*, Brunel, UK, June 2019.
- [28] S. CHAILLAT, F. AMLANI, A. LOSEILLE, Recent developments on adaptive fast Boundary Element Methods to model elastic wave propagation in sedimentary basin. In *Colloque National en Calcul des Structures*, Giens, France, May 2019.
- [29] F. AMLANI, S. CHAILLAT, A. LOSEILLE, Anisotropic mesh adaptation for 3D accelerated high-order boundary element methods in acoustics. In *CILAMCE*, Compiègne, France, November 2018.
- [30] F. AMLANI, S. CHAILLAT, A. LOSEILLE, Anisotropic mesh adaptation for 3D accelerated high-order boundary element methods in acoustics. In *2nd International Conference on Advanced Modelling of Wave Propagation in Solids*, Prague, Czech Republic, October 2018.
- [31] S. CHAILLAT, P. CIARLET, F. AMLANI, F. KPADANOU, A. LOSEILLE, Fast and Adaptive Boundary Element Methods for 3D Acoustic and Elastodynamic Problems. In *WCCM*, New York, USA, July 2018.
- [32] S. CHAILLAT, M. DARBAS, F. LE LOUËR, Analytic preconditioners for 3D high-frequency elastic scattering problems. In *IABEM 2018*, Paris, France, June 2018.
- [33] F. AMLANI, S. CHAILLAT, A. LOSEILLE, Anisotropic mesh adaptation for 3D accelerated high-order boundary element methods in acoustics. In *IABEM 2018*, Paris, France, June 2018.
- [34] A.S. BONNET-BENDHIA, S. CHAILLAT, S. FLISS, Y. TJANDRAWIDJAJA, Coupling BEMs in overlapping domains when a global Green's function. In *IABEM 2018*, Paris, France, June 2018.
- [35] F. KPADANOU, S. CHAILLAT, P. CIARLET, Efficient parallel implementation of H-matrix based solvers for 3D Helmholtz and elastodynamic oscillatory kernels. In *IABEM 2018*, Paris, France, June 2018.
- [36] S. CHAILLAT, P. CIARLET, L. DESIDERIO, On the efficiency of an H-matrix based direct solver for the Boundary Element Method in 3D elastodynamics. In *ACOMEN*, Ghent, Belgium, September 2017.
- [37] S. CHAILLAT, P. CIARLET, L. DESIDERIO, A Fast Direct Solver Based on the Boundary Element Method to Model 3-D Elastic Waves in Large Domains. In *First Paris-London BEM Workshop*, London, UK, June 2017.
- [38] S. CHAILLAT, P. CIARLET, A Fast Direct Solver Based on the Boundary Element Method to Model 3-D Elastic Waves in Large Domains. In *IPAM Workshop on Full Waveform Inversion and Velocity Analysis*, Los Angeles, USA, May 2017.
- [39] S. CHAILLAT, Fast solvers for 3D elastodynamic Boundary Element Methods. In *Oberwolfach Miniworkshop: Fast Solvers for Highly Oscillatory*, Oberwolfach, Germany, November 2016 (Workshop by invitation only).
- [40] S. CHAILLAT, An incomplete (and subjective) overview of Fast Multipole Methods for oscillatory kernels. In *Oberwolfach Miniworkshop: Fast Solvers for Highly Oscillatory*, Oberwolfach, Germany, November 2016 (Workshop by invitation only).

- [41] S. CHAILLAT, P. CIARLET, L. DESIDERIO, An \mathcal{H} -matrix based direct solver for the Boundary Element Method in 3D elastodynamics. In *SIAM Annual Meeting*, Boston, USA, July 2016.
- [42] S. CHAILLAT, Fast solvers for the Boundary Element Method in 3D elastodynamics. In *PDESoft*, Coventry, England, July 2016 (invited plenary talk).
- [43] S. CHAILLAT, P. CIARLET, L. DESIDERIO, A Fast Direct Solver Based on the Boundary Element Method to Model 3-D Elastic Waves in Large Domains. In *EAGE Workshop: Methods and Challenges of Seismic Wave Modelling for Seismic Imaging*, Vienna, Austria, June 2016.
- [44] S. CHAILLAT, P. CIARLET, L. DESIDERIO, An \mathcal{H} -matrix based direct solver for the Boundary Element Method in 3D elastodynamics. In *New Trends in Integral Equations*, Palaiseau, France, February 2016 (invited talk).
- [45] S. CHAILLAT, M. DARBAS, F. LE LOUËR, A Well-Conditioned Fast Multipole Boundary Element Method for 3-D Elastodynamics. In *WAVES 2015*, Karlsruhe, Germany, July 2015.
- [46] S. CHAILLAT, P. CIARLET, L. DESIDERIO, An H-matrix based direct solver for the Boundary Element Method in 3D elastodynamics. In *WAVES 2015*, Karlsruhe, Germany, July 2015.
- [47] S. CHAILLAT, M. DARBAS, F. LE LOUËR, A Well-Conditioned Fast Multipole BEM for 3-D Elastodynamics in the Frequency Domain. In *SIAM in the Geosciences*, Palo Alto, USA, July 2015.
- [48] S. CHAILLAT, M. DARBAS, F. LE LOUËR, A new analytic preconditioner for the iterative solution of Dirichlet exterior scattering problems in 3D elasticity. In *WCCM 2014*, Barcelona, Spain, July 2014.
- [49] S. CHAILLAT, G. BIROS, A fast and adaptive algorithm for the inverse medium problem based on Singular Value Decomposition. In *3rd European Conference on Computational Optimization*, Chemnitz, Germany, July 2013.
- [50] S. CHAILLAT, A. LOSEILLE, An Adapted Fast Multipole Accelerated Boundary Element Method for 3D Elastodynamics. In *SIAM in the Geosciences*, Padua, Italy, June 2013.
- [51] J. VIRIEUX, R. BROSSIER, S. CHAILLAT, A. DUCHKOV, E. ETIENNE, B. LOMBARD, S. OPERTO, A. SERDYUKOV, Seismic Elastic Modeling for Seismic Imaging. In *SIAM in the Geosciences*, Padua, Italy, June 2013.
- [52] S. CHAILLAT, M. BONNET, Fast Multipole Accelerated Boundary Element Method for problems in an elastic Half-Space. In *WAVES 2013*, Tunis, Tunisia, June 2013.
- [53] S. CHAILLAT, M. BONNET, Comparison of two Fast Multipole Accelerated BEMs for 3D elastodynamic problems in semi-infinite media. In *IABEM 2013*, Santiago, Chile, January 2013.
- [54] S. CHAILLAT, M. BONNET, A New Fast Multipole Method for 3D Elastodynamics based using the Half-Space Fundamental Solutions. In *EUROMECH Colloquium 540: Advanced Modelling of Wave Propagation in Solids*, Prague, Czech Republic, October 2012.
- [55] S. CHAILLAT, M. BONNET, A New Fast Multipole Method for Elasticity based on the Half-Space Fundamental Solutions. In *ECCOMAS 2012*, Vienna, Austria, September 2012.
- [56] S. CHAILLAT, M. BONNET, Formulation and Fast Evaluation of the Multipole Expansions of the Elastic Half-Space Fundamental Solutions. In *ESMC 2012*, Graz, Austria, July 2012.
- [57] E. GRASSO, S. CHAILLAT, M. BONNET, J.-F. SEMBLAT, Coupling the Finite Element Method and the Fast Multipole Boundary Element Method in 3-D Visco-elastodynamics. In *ESMC 2012*, Graz, Austria, July 2012.
- [58] S. CHAILLAT, M. BONNET, A new fast multipole formulation for the elastodynamic half-space fundamental solutions. In *4th Workshop BEM on the Saar*, Saarbrücken, Germany, May 2012.
- [59] S. CHAILLAT, G. BIROS, A fast and adaptive algorithm for the inverse medium problem with multiple frequencies and multiple sources for the 3-D time-harmonic wave equation. In *EURODYN 2011*, Leuven, Belgium, July 2011 (accepted).
- [60] S. CHAILLAT, G. BIROS, Algorithme rapide et adaptatif pour le problème inverse de milieu pour l'équation des ondes scalaire, avec fréquences et sources multiples. In *10^e Colloque National en Calcul des Structures*, Giens, France, May 2011.

- [61] E. GRASSO, S. CHAILLAT, J.-F. SEMBLAT, M. BONNET, Méthode multipôle rapide multi-niveaux en visco-élastodynamique 3D. In *10^e Colloque National en Calcul des Structures*, Giens, France, May 2011.
- [62] S. CHAILLAT, G. BIROS, A Fast Algorithm for the Time Harmonic Elastic Inverse Medium with Multiple Events. In *SIAM CSE*, Reno, USA, March 2011.
- [63] S. CHAILLAT, G. BIROS, General fast inversion method to recover small 3-D inhomogeneities using a small number of sources and excitation frequencies. In *IV European Congress on Computational Mechanics (ECCM 2010)*, Paris, France, May 2010.
- [64] E. GRASSO, R. BOST, S. CHAILLAT, J.F. SEMBLAT, M. BONNET, Multi-level fast multipole BEM for the complex-wavenumber formulation of 3-D viscoelastodynamics. In *IV European Congress on Computational Mechanics (ECCM 2010)*, Paris, France, May 2010.
- [65] S. CHAILLAT, H.D. BUI, On the identification of an inhomogeneity in viscoelasticity. In *IV European Congress on Computational Mechanics (ECCM 2010)*, Paris, France, May 2010.
- [66] A. CONSTANTINESCU, H.D. BUI, S. CHAILLAT, E. GRASSO, Identification of a planar crack in Zener type viscoelasticity. In *IV European Congress on Computational Mechanics (ECCM 2010)*, Paris, France, May 2010.
- [67] S. CHAILLAT, G. BIROS, FaIMS: A Fast Algorithm for the Inverse Medium Problem in Acoustic Scattering. In *SIAM Conference on Imaging Science*, Chicago, USA, April 2010
- [68] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Fast multipole method for 3-D elastodynamic boundary integral equations. Application to seismic wave propagation (invited). In *COMPdyn 2009 (ECCOMAS)*, Islands of Rhodes, Greece, June 2009.
- [69] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A new fast BEM for 3-D multi-domain elastic wave propagation problems. In *WAVES 2009*, Pau, France, June 2009.
- [70] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Fast multipole method for 3-D elastodynamic boundary integral equations. Application to seismic wave propagation (plenary talk). In *9^e Colloque National en Calcul des Structures*, Giens, France, May 2009.
- [71] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Fast multipole accelerated boundary element method for elastic wave propagation in multi-region domains. In *9^e Colloque National en Calcul des Structures*, Giens, France, May 2009.
- [72] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Diffraction of seismic waves from 3-D canyons and alluvial basins modeled using the fast multipole accelerated BEM. In *14 WCEE*, Beijing, China, October 2008.
- [73] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A multi-level fast multipole multi-region method for 3D seismic response of alluvial basins. In *WCCM8*, Venice, Italy, July 2008.
- [74] S. CHAILLAT, J.F. SEMBLAT, M. BONNET, A multi-level fast multipole multi-region method for 3-D frequency-domain elastodynamics. In *EM08*, Minneapolis, USA, May 2008.
- [75] S. CHAILLAT, J.F. SEMBLAT, M. BONNET, A multi-level fast multipole multi-region method for 3-D elastodynamics in the frequency domain. In *GAMM2008*, Bremen, Germany, April 2008.
- [76] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Diffraction of seismic waves from 3-D canyons and alluvial basins modeled using the Fast Multipole-accelerated BEM. In *AGU fall meeting*, San Francisco, USA, December 2007.
- [77] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Accélération des calculs de propagation d'ondes élastiques par la méthode multipôle rapide (formulation par équations intégrales de frontière). In *18^e Congrès Français de mécanique*, Grenoble, France, August 2007.
- [78] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Fast multipole boundary integral equation method for 3D seismic wave propagation in alluvial basins. In *9th US National Congress on Computational Mechanics*, San Francisco, USA, July 2007.
- [79] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Modélisation de la propagation d'ondes sismiques en 3D par la "méthode multipôle rapide". In *7^e Colloque National AFPS 2007*, Paris, France, July 2007.
- [80] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A new fast BEM method to model site effects in alluvial basins. In *4th International Conference on Earthquake Geotechnical Engineering*, Thessaloniki, Greece, June 2007.
- [81] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, A fast multipole accelerated BEM for 3-D seismic wave computation. In *COMPdyn 2007 (ECCOMAS)*, Rethymno, Greece, June 2007.

- [82] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Méthode multipôle rapide pour les éléments de frontière en élastodynamique tridimensionnelle : application à la propagation d'ondes sismiques. In *8^e Colloque National en Calcul des Structures*, Giens, France, May 2007.
- [83] S. CHAILLAT, M. BONNET, J.F. SEMBLAT, Fast multipole method formulation for 3D elastodynamics in the frequency domain. In *23rd Annual GAMM-Seminar Leipzig on Integral Equation Methods for High-frequency Scattering Problems*, Leipzig, Germany, January 2007.

Seminar presentations

- [84] S. CHAILLAT, Quelques méthodes (complémentaires) pour accélérer la résolution de la méthode des éléments de frontière pour les ondes élastiques. In *Séminaire POEMS-CMAP*, Palaiseau, France, Feb. 2019.
- [85] On the efficiency of an H-matrix based direct solver for the Boundary Element Method in 3D elastodynamics. *Seminar*, EPFL, Switzerland, October 2017.
- [86] A fast direct solver based on the boundary element method to model 3-D elastic waves in large domains. *Applied Math Seminar*, CSUN, USA, May 2017.
- [87] Preconditioners for fast boundary element methods in 3D elastodynamics. *IPAM Seminar*, UCLA, USA, May 2017.
- [88] An H-matrix based direct solver for the Boundary Element Method in 3D elastodynamics. *Séminaire du LMA*, Marseille, France, October 2016.
- [89] Fast solvers for 3D elastodynamic Boundary Element Methods. *ICES Seminar*, University of Texas at Austin, USA, October 2015.
- [90] Fast multipole accelerated boundary integral equation method for 3-D elastodynamic problems in a half-space. *University of Zurich*, Zurich, Switzerland, March 2014.
- [91] A new Analytic Preconditioner for the Fast Multipole accelerated Boundary Element Method in 3-D elastodynamics. *Department of Mathematics*, University of Parma, Italy, February 2014.
- [92] Fast multipole accelerated boundary integral equation method for 3-D elastodynamic problems in a half-space. *Séminaire EDP LJK*, Grenoble, France, November 2013.
- [93] Fast multipole accelerated boundary integral equation method for 3-D elastodynamic problems in a half-space. *Séminaire Equipe ENI MSSMAT*, Chatenay-Malabry, France, November 2013.
- [94] Résolution d'un problème inverse de diffraction acoustique de grande taille à l'aide de la Décomposition en Valeurs Singulières. *Séminaire UMA*, Palaiseau, France, June 2013.
- [95] Fast multipole accelerated boundary integral equation method for 3-D elastodynamic problems in a half-space. *Séminaire POEMS*, Palaiseau, France, February 2013.
- [96] Fast multipole accelerated boundary integral equation method for 3-D elastodynamic problems in a half-space. *Séminaire ISTERRE*, Grenoble, France, February 2013.
- [97] Fast multipole accelerated boundary integral equation method for 3-D elastodynamic problems in a half-space. *Séminaire du LMA*, Marseille, France, January 2013.
- [98] Fast multipole accelerated boundary integral equation method for 3-D elastodynamic problems in a half-space. *Séminaire du LaMSID*, EDF R&D Clamart, France, September 2012.
- [99] Fast Multipole Method for 3-D elastodynamic and viscoelastodynamic boundary integral equations. *Séminaire d'analyse numérique*, Université Rennes 1, France, June 2011.
- [100] Fast Multipole Method for 3-D elastodynamic and viscoelastodynamic boundary integral equations. *Department of Mathematics*, University of Parma, Italy, June 2011.
- [101] FaIMS: A Fast Algorithm for the inverse medium problem in acoustic scattering. *Séminaire de l'équipe projet DEFI*, INRIA Saclay, France, March 2011.
- [102] Forward and inverse fast numerical methods for wave propagation. *Séminaire de l'équipe projet POems*, INRIA Rocquencourt, France, December 2009.
- [103] Forward and inverse fast numerical methods for wave propagation. *LMS*, École Polytechnique, France, November 2009.

- [104] Forward and inverse fast numerical methods for wave propagation. *ENAC*, École Polytechnique Fédérale de Lausanne, Switzerland, October 2009.
- [105] Fast Multipole Method for 3-D elastodynamic boundary integral equations. Application to multi-region elastic wave propagation problems. *CSELA*, Georgia Institute of Technology, USA, February 2009.
- [106] Fast Multipole Method for 3-D elastodynamic boundary integral equations. Application to multi-region elastic wave propagation problems. *Seminar of the institute of applied mechanics*, Graz University of Technology, Austria, November 2008.
- [107] Presentation of the Fast Multipole Method formulation for 3D elastodynamics in the frequency domain. *QSHA meeting*, LCPC Paris, France, November 2006.
- [108] Fast Multipole Method formulation for 3D elastodynamics in the frequency domain: single-level algorithm, *LCPC seminar*. LCPC Paris, France, January 2006.