

## CURRICULUM VITAE

— Patrick Ciarlet —  
September 2022

### PERSONAL

- **Address:**  
Laboratoire POEMS, ENSTA Paris, Institut Polytechnique de Paris,  
828, boulevard des Maréchaux, 91762 Palaiseau Cedex, France
- **Email:** patrick.ciarlet@ensta-paris.fr; **Phone:** (33) 1 81 87 20 92; **Fax:** (33) 1 81 87 21 30
- **Born:** April 1965, Cleveland, USA.

### EDUCATION

- **Ecole Polytechnique:** 1985–1988
- **ENSTA Paris:** 1988–1990
- **Ph. D in Applied Mathematics:** 1992, Paris 6 University
- **Habilitation à Diriger les Recherches in Mathematics:** 1998, Paris 6 University

### WORKING EXPERIENCE

- **Professor:** 2011–present, Dept of Applied Mathematics, ENSTA
- **Coordinator of the Mathematics and Applications Master’s Program:** 2019–present, Institut Polytechnique de Paris
- **Deputy Head of the Master’s Degree Analysis, Modelling and Simulation:** 2014–2019, Paris Saclay Univ.
- **Teacher-Researcher:** 1997–2011, Dept of Applied Mathematics, ENSTA
- **Visiting Professor:** 01/2010–06/2010, Dept of Mathematics, Chinese Univ. of Hong Kong, China
- **Researcher:** 1994–1997, Dept CSA at the Commissariat à l’Energie Atomique

- **Post Doctoral Research Fellow:** 1993–1994, Dept of Math., Univ. of California at Los Angeles, USA
- **Junior Researcher:** 1990–1993, Parallel Computing Project at the Commissariat à l’Energie Atomique

### **MAIN RESEARCH INTERESTS/FIELDS OF SPECIALIZATION**

Mathematical study of metamaterials

Maxwell system of equations and related models in electromagnetism

Neutron diffusion equations

Numerical solution of low-regularity PDE problems

Domain Decomposition Methods

### **FELLOWSHIPS/AWARDS/HONORS**

- **Guest Professor:** 2011, Graduate Studies at Univ. Santiago de Compostela, Spain
- **Associate Professor:** 2005–2007, Ecole Polytechnique
- **Guest Professor:** 2002, Graduate Studies at Strasbourg Univ.
- **Guest Professor:** 2002, Graduate Studies at Univ. of Houston, USA
- **Associate Professor:** 1999–2000, Ecole Polytechnique
- **Guest Professor:** 1998, Ecole des Ondes, INRIA
- **Member of the Ordre National du Mérite (Chevalier), France**
- **Member of the Ordre des Palmes Académiques (Chevalier), France**

### **EDITORIAL BOARD MEMBER OF MATHEMATICAL JOURNALS**

January 2013 – present: Mathematical Modelling and Numerical Analysis. ESAIM

January 2012 – December 2017: Computers & Mathematics with Applications. Elsevier

July 2008 – June 2015: Differential Equations and Applications. Element d.o.o., Croatia

## REFEREES FOR SCIENTIFIC JOURNALS AND BOOKS

**Journals:** Abstract and Applied Analysis (1); Advances in Computational Mathematics (1); Applied Mathematics and Computation (4); Applied Numerical Mathematics (1); Archive for Rational Mechanics and Analysis (1); Calcolo (1); Communications in Mathematical Sciences (1); C. R. Acad. Sci. Paris, Ser. I (4); Comput. Methods Appl. Mech. Engrg. (4); Computers Math. Applic. (8); Discrete and Continuous Dynamical Systems, Series B (1); Forum Math. (1); Found. Comput. Math. (1); Int. J. Supercomputer Applications (1); Inverse Problems (1); J. Math. Pures Appl. (1); J. Applied Numerical Analysis (1); J. Comput. Appl. Math. (4); J. Computational Mathematics (1); J. Differential Equations (1); J. Comput. Phys. (6); J. Math. Anal. Appl. (1); J. Sci. Comput. (2); Math. Meth. Appl. Sci. (3); Math. Models Meth. App. Sci. (3); Math. Comp. (5); Math. Mod. Num. Anal. (6); Numer. Methods Partial Differ. Equations (2); Numer. Math. (9); Physics of the Earth and Planetary Interiors (1); PIER & JEMWA (3); SIAM J. Math. Anal. (6); SIAM J. Numer. Anal. (11); SIAM J. Sci. Comput. (4)

**Books:** Computational Mathematics – Springer Series (1); Lecture Notes in Mathematics – Springer Series (1)

## SERVICE AT PROFESSIONAL COMMITTEES

- **Coordinator of the Mathematics in Computational Science and Engineering Program at the Labex Mathématique Hadamard (LMH):** 2018–present
- **Member of the Mathematics, Applied Mathematics and Computer Science Experts Committee, EDX (Ecole Polytechnique-ENSTA):** 2010–2015
- **Rapporteur of Ph. D:** 2003–present
- **Rapporteur of Habilitation à Diriger les Recherches:** 2008–present
- **Academic Committees for professorships:** 2005 & 2007, external assessment for the Academy of Mathematics & Systems Science, Chinese Academy of Sciences; 2011, external assessment for the Ecole Centrale de Lyon.
- **Grant evaluation:**
  - 2006, Délégation Générale pour l’Armement
  - 2006, Swiss National Science Foundation (Switzerland)
  - 2009, Région Rhône-Alpes
  - 2010, Air Force Office of Scientific Research (USA)
  - 2018-2022, Labex Mathématique Hadamard
  - 2020, Dutch Research Council (Netherlands)
  - 2021, National Research and Development Agency (Chile)

**PROFESSIONAL MEMBERSHIP**

Société de Mathématiques Appliquées et Industrielles (SMAI)

European Mathematical Society (EMS)

Society for Industrial and Applied Mathematics (SIAM)

**CO-ORGANIZER OF CONFERENCES/WORKSHOPS**

TIPE Earth and Space Conference, Paris, 1998

Motion of Charged Particles Conference, Strasbourg, 2001

Vector Finite Elements Day, Paris, 2004

**RESEARCH GRANTS/CONTRACTS**

Délégation Générale pour l'Armement postdoctoral fellowship, Oct. 1993 – Oct. 1994

France/Hong Kong PROCORE Joint Research Scheme grant Oct. 2000 – Sep. 2001

France/Hong Kong PROCORE Joint Research Scheme grant Oct. 2001 – Sep. 2002

DGA/ENSTA contract 'Computation of intense electromagnetic fields', Sep. 2003 – Aug. 2006

France-AmSud grant 'Nonlocal and local coupled equations' Jan. 2022 – Jun. 2023

CIEDS/ENSTA contract 'ElectroMath', Sep. 2022 – Aug. 2026

**TEACHING EXPERIENCE**

Variational methods for solving indefinite problems (ENSTA, Paris-Saclay Univ., Institut Polytechnique de Paris)

Parallel Computing: From Practice To Theory (ENSTA, Versailles-St-Quentin Univ., Paris-Saclay Univ.)

Practical Tools for Solving Indefinite Problems (Univ. Santiago de Compostela, ENSTA)

Maxwell's Equations (ENSTA, Versailles-St-Quentin Univ., Strasbourg Univ., Univ. of Houston, Chinese Univ. of Hong Kong, Paris-Saclay Univ., Institut Polytechnique de Paris)

Electromagnetic Waves (ENSTA, Versailles-St-Quentin Univ., INRIA)

Finite Element Methods (ENSTA)

Numerical Solution of PDEs (ENSTA, Ecole Polytechnique)

Introduction to Scientific Computing (ENSTA, Chinese Univ. of Hong Kong)

Quadratic Optimization & Linear Algebra (ENSTA)

**PUBLICATIONS IN REFEREED JOURNALS**

1. P. Ciarlet, Jr. (1993). A decomposition of  $L^2(\Omega)^3$  and an application to magnetostatic equations. *Math. Models Meth. App. Sci.*, **3**, 289-301.
2. P. Ciarlet, Jr. (1994). Implementation of a domain decomposition method well-suited for parallel architectures. *High Speed Comp.*, **6**, 157-182.
3. P. Ciarlet, Jr. (1994). Repeated Red-Black ordering: a new approach. *Numerical Algorithms*, **7**, 295-324.
4. P. Ciarlet, Jr., F. Lamour (1996). On the validity of a front-oriented approach to partitioning large sparse graphs with a connectivity constraint. *Numerical Algorithms*, **12**, 193-214.
5. F. Assous, P. Ciarlet, Jr., E. Sonnendrücker (1996). Résolution des équations de Maxwell dans un domaine avec un coin rentrant. *C. R. Acad. Sci. Paris, Ser. I*, **323**, 203-208.
6. P. Ciarlet, Jr., F. Lamour (1996). Does contraction preserve triangular meshes? *Numerical Algorithms*, **13**, 201-223.
7. P. Ciarlet, Jr., J. Zou (1997). Finite element convergence for the Darwin model to Maxwell's equations. *Math. Mod. Num. Anal.*, **31**, 213-250.
8. T. F. Chan, P. Ciarlet, Jr., W. K. Szeto (1997). On the optimality of the median cut spectral bisection graph partitioning method. *SIAM J. Sci. Comput.*, **18**, 943-948.
9. P. Ciarlet, Jr., E. Sonnendrücker (1997). A decomposition of the electric field. Application to the Darwin model. *Math. Models Meth. App. Sci.*, **7**, 1085-1120.
10. F. Assous, P. Ciarlet, Jr. (1997). Une caractérisation de l'orthogonal de  $\Delta(H^2(\Omega) \cap H_0^1(\Omega))$  dans  $L^2(\Omega)$ . *C. R. Acad. Sci. Paris, Ser. I*, **325**, 605-610.
11. F. Assous, P. Ciarlet, Jr., E. Sonnendrücker (1998). Resolution of the Maxwell equations in a domain with reentrant corners. *Math. Mod. Num. Anal.*, **32**, 359-389.
12. P. Ciarlet, Jr., C. Hazard, S. Lohrengel (1998). Les équations de Maxwell dans un polyèdre : un résultat de densité. *C. R. Acad. Sci. Paris, Ser. I*, **326**, 1305-1310.
13. F. Assous, P. Ciarlet, Jr. (1998). Quelques résultats sur la régularité en temps des équations de Maxwell instationnaires. *C. R. Acad. Sci. Paris, Ser. I*, **327**, 719-724.
14. F. Assous, P. Ciarlet, Jr., P.-A. Raviart, E. Sonnendrücker (1999). A characterization of the singular part of the solution to Maxwell's equations in a polyhedral domain. *Math. Meth. Appl. Sci.*, **22**, 485-499.
15. P. Ciarlet, Jr., J. Zou (1999). Fully discrete finite element approaches for time-dependent Maxwell's equations. *Numer. Math.*, **82**, 193-219.
16. F. Assous, P. Ciarlet, Jr., S. Labrunie (1999). Caractérisation de la partie singulière et résolution des équations de Maxwell en géométrie singulière axisymétrique. *C. R. Acad. Sci. Paris, Ser. I*, **328**, 767-772.
17. F. Assous, P. Ciarlet, Jr., E. Garcia (2000). Résolution des équations de Maxwell instationnaires avec charges dans un domaine singulier bidimensionnel. *C. R. Acad. Sci. Paris, Ser. I*, **330**, 391-396.
18. F. Assous, P. Ciarlet, Jr., J. Segré (2000). Numerical solution to the time-dependent Maxwell equations in two-dimensional singular domains: the Singular Complement Method. *J. Comput. Phys.*, **161**, 218-249.

19. P. Ciarlet, Jr., N. Filonov, S. Labrunie (2000). Un résultat de fermeture pour les équations de Maxwell en géométrie axisymétrique. *C. R. Acad. Sci. Paris, Ser. I*, **331**, 293-298.
20. A. Buffa, P. Ciarlet, Jr. (2001). On traces for functional spaces related to Maxwell's equations. Part I: an integration by parts formula in Lipschitz polyhedra. *Math. Meth. Appl. Sci.*, **24**, 9-30.
21. A. Buffa, P. Ciarlet, Jr. (2001). On traces for functional spaces related to Maxwell's equations. Part II: Hodge decompositions on the boundary of Lipschitz polyhedra and applications. *Math. Meth. Appl. Sci.*, **24**, 31-48.
22. F. Assous, P. Ciarlet, Jr., S. Labrunie (2002). Theoretical tools to solve the axisymmetric Maxwell equations. *Math. Meth. Appl. Sci.*, **25**, 49-78.
23. P. Ciarlet, Jr., V. Girault (2002). Condition inf-sup pour l'élément fini de Taylor-Hood  $P_2$ -iso- $P_1$ , 3D; application aux équations de Maxwell. *C. R. Acad. Sci. Paris, Ser. I*, **335**, 827-832.
24. P. Ciarlet, Jr., J. He (2003). The Singular Complement Method for 2d problems. *C. R. Acad. Sci. Paris, Ser. I*, **336**, 353-358.
25. F. Assous, P. Ciarlet, Jr., S. Labrunie (2003). Solution of axisymmetric Maxwell equations. *Math. Meth. Appl. Sci.*, **26**, 861-896.
26. P. Ciarlet, Jr., J. Huang, J. Zou (2003). Some observations on generalized saddle-point problems. *SIAM J. Matrix Anal. Appl.*, **25**, 224-236.
27. P. Ciarlet, Jr. (2003). Système de Stokes avec flux de vitesse et pression imposés. *C. R. Acad. Sci. Paris, Ser. I*, **337**, 119-124.
28. F. Assous, P. Ciarlet, Jr., S. Labrunie, J. Segré (2003). Numerical solution to the time-dependent Maxwell equations in axisymmetric singular domains: the Singular Complement Method. *J. Comput. Phys.*, **191**, 147-176.
29. Philippe Ciarlet, P. Ciarlet, Jr. (2004). Another approach to linearized elasticity and Korn's inequality. *C. R. Acad. Sci. Paris, Ser. I*, **339**, 307-312.
30. P. Ciarlet, Jr., E. Garcia, J. Zou (2004). Solving Maxwell equations in 3D prismatic domains. *C. R. Acad. Sci. Paris, Ser. I*, **339**, 721-726.
31. P. Ciarlet, Jr. (2005). Augmented formulations for solving Maxwell equations. *Comput. Methods Appl. Mech. Engrg.*, **194**, 559-586.
32. Philippe Ciarlet, P. Ciarlet, Jr. (2005). Another approach to linearized elasticity and a new proof of Korn's inequality. *Math. Models Meth. App. Sci.*, **15**, 259-271.
33. F. Assous, P. Ciarlet, Jr., E. Garcia (2005). Singular electromagnetic fields: inductive approach. *C. R. Acad. Sci. Paris, Ser. I*, **341**, 605-610.
34. P. Ciarlet, Jr., B. Jung, S. Kaddouri, S. Labrunie, J. Zou (2005). The Fourier Singular Complement Method for the Poisson problem. Part I: prismatic domains. *Numer. Math.*, **101**, 423-450.
35. P. Ciarlet, Jr., B. Jung, S. Kaddouri, S. Labrunie, J. Zou (2006). The Fourier Singular Complement Method for the Poisson problem. Part II: axisymmetric domains. *Numer. Math.*, **102**, 583-610.

36. F. Assous, P. Ciarlet, Jr., E. Garcia, J. Segré (2006). Time-dependent Maxwell's equations with charges in singular geometries. *Comput. Methods Appl. Mech. Engrg.*, **196**, 665-681.
37. P. Ciarlet, Jr., S. Kaddouri (2006). Justification de la loi de Peek en électrostatique. *C. R. Acad. Sci. Paris, Ser. I*, **343**, 671-674. (Corrigendum *C. R. Acad. Sci. Paris, Ser. I*, **344**, 657 (2007).)
38. A.-S. Bonnet-Ben Dhia, P. Ciarlet, Jr., C. M. Zwölf (2007). Two- and three-field formulations for wave transmission between media with opposite sign dielectric constants. *J. Comput. Appl. Math.*, **204**, 408-417.
39. P. Ciarlet, Jr., G. Legendre (2007). Well-posedness of the Drude-Born-Fedorov model for chiral media. *Math. Models Meth. App. Sci.*, **17**, 461-484.
40. R. Barthelmé, P. Ciarlet, Jr., E. Sonnendrücker (2007). Generalized formulations of Maxwell's equations for numerical Vlasov-Maxwell simulations. *Math. Models Meth. App. Sci.*, **17**, 657-680.
41. P. Ciarlet, Jr., S. Kaddouri (2007). Multiscaled asymptotic expansions for the electric potential: surface charge densities and electric fields at rounded corners. *Math. Models Meth. App. Sci.*, **17**, 845-876.
42. Philippe Ciarlet, P. Ciarlet, Jr., G. Geymonat, F. Krasucki (2007). Characterization of the kernel of the operator CURL CURL. *C. R. Acad. Sci. Paris, Ser. I*, **344**, 305-308.
43. P. Ciarlet, Jr., E. Jamelot (2007). Continuous Galerkin methods for solving the time-dependent Maxwell equations in 3D geometries. *J. Comput. Phys.*, **226**, 1122-1135.
44. C. Amrouche, Philippe Ciarlet, P. Ciarlet, Jr. (2007). Vector and scalar potentials, Poincaré's theorem and Korn's inequality. *C. R. Acad. Sci. Paris, Ser. I*, **345**, 603-608.
45. Philippe Ciarlet, P. Ciarlet, Jr. (2008). A new approach for approximating linear elasticity problems. *C. R. Acad. Sci. Paris, Ser. I*, **346**, 351-356.
46. F. Assous, P. Ciarlet, Jr., E. Garcia (2008). A characterization of singular electromagnetic fields by an inductive approach. *Numerical Analysis and Modeling*, **5**, 491-515.
47. A.-S. Bonnet-Ben Dhia, P. Ciarlet, Jr., C. M. Zwölf (2008). A new compactness result for electromagnetic waves. Application to the transmission problem between dielectrics and metamaterials. *Math. Models Meth. App. Sci.*, **18**, 1605-1631.
48. P. Ciarlet, Jr., G. Hechme (2008). Computing electromagnetic eigenmodes with continuous Galerkin approximations. *Comput. Methods Appl. Mech. Engrg.*, **198**, 358-365.
49. Philippe Ciarlet, P. Ciarlet, Jr. (2009). Direct computation of stresses in planar linearized elasticity. *Math. Models Meth. App. Sci.*, **19**, 1043-1064.
50. A. Buffa, P. Ciarlet, Jr., E. Jamelot (2009). Solving electromagnetic eigenvalue problems in polyhedral domains with nodal finite elements. *Numer. Math.*, **113**, 497-518.
51. P. Ciarlet, Jr., S. Labrunie (2009). Numerical analysis of the generalized Maxwell equations (with an elliptic correction) for charged particle simulations. *Math. Models Meth. App. Sci.*, **19**, 1959-1994.
52. P. Ciarlet, Jr., F. Lefèvre, S. Lohrengel, S. Nicaise (2010). Weighted regularization for composite materials in electromagnetism. *Math. Mod. Num. Anal.*, **44**, 75-108.

53. A.-S. Bonnet-Ben Dhia, P. Ciarlet, Jr., C. M. Zwölf (2010). Time harmonic wave diffraction problems in materials with sign-shifting coefficients. *J. Comput. Appl. Math.*, **234**, 1912-1919 (Corrigendum *J. Comput. Appl. Math.*, **234**, 2616).
54. C. Amrouche, Philippe Ciarlet, P. Ciarlet, Jr. (2010). Weak vector and scalar potentials. Applications to Poincaré's theorem and Korn's inequality in Sobolev spaces with negative exponents. *Analysis and Applications*, **8**, 1-17.
55. P. Ciarlet, Jr., C. Scheid (2010). Electrowetting of a 3D drop: numerical modelling with electrostatic vector fields. *Math. Mod. Num. Anal.*, **44**, 647-670.
56. Philippe Ciarlet, P. Ciarlet, Jr., O. Iosifescu, S. Sauter, J. Zou (2010). A Lagrangian approach to intrinsic linearized elasticity. *C. R. Acad. Sci. Paris, Ser. I*, **348**, 587-592.
57. P. Ciarlet, Jr., S. Labrunie (2011). Numerical solution of Maxwell's equations in axisymmetric domains with the Fourier Singular Complement Method. *Differential Equations and Applications*, **3**, 113-155.
58. Philippe Ciarlet, P. Ciarlet, Jr., O. Iosifescu, S. Sauter, J. Zou (2011). Lagrange multipliers in intrinsic elasticity. *Math. Models Meth. App. Sci.*, **21**, 651-666.
59. L. Chesnel, P. Ciarlet, Jr. (2011). Compact imbeddings in electromagnetism with interfaces between classical materials and meta-materials. *SIAM J. Math. Anal.*, **43**, 2150-2169.
60. A.-S. Bonnet-Ben Dhia, L. Chesnel, P. Ciarlet, Jr. (2012). T-coercivity for scalar interface problems between dielectrics and metamaterials. *Math. Mod. Num. Anal.*, **46**, 1363-1387.
61. P. Ciarlet, Jr. (2012). T-coercivity: application to the discretization of Helmholtz-like problems. *Computers Math. Applic.*, **64**, 22-34.
62. E. T. Chung, P. Ciarlet, Jr. (2013). A staggered discontinuous Galerkin method for wave propagation in media with dielectrics and meta-materials. *J. Comput. Appl. Math.*, **239**, 189-207.
63. E. T. Chung, P. Ciarlet, T. F. Yu (2013). Convergence and superconvergence of staggered discontinuous Galerkin methods for the three-dimensional Maxwell's equations on Cartesian grids. *J. Comput. Phys.*, **235**, 14-31.
64. L. Chesnel, P. Ciarlet, Jr. (2013). T-coercivity and continuous Galerkin methods: application to transmission problems with sign changing coefficients. *Numer. Math.*, **124**, 1-29.
65. E. Jamelot, P. Ciarlet, Jr. (2013). Fast non-overlapping Schwarz domain decomposition methods for solving the neutron diffusion equation. *J. Comput. Phys.*, **241**, 445-463.
66. P. Ciarlet, Jr. (2013). Analysis of the Scott-Zhang interpolation in the fractional order Sobolev spaces. *J. Numer. Math.*, **21**, 173-180.
67. A.-S. Bonnet-Ben Dhia, L. Chesnel, P. Ciarlet, Jr. (2014). Two-dimensional Maxwell's equations with sign-changing coefficients. *Applied Numerical Mathematics*, **79**, 29-41.
68. P. Ciarlet, Jr., H. Wu, J. Zou (2014). Edge element methods for Maxwell's equations with strong convergence for Gauss' laws. *SIAM J. Numer. Anal.*, **52**, 779-807.
69. A.-S. Bonnet-Ben Dhia, L. Chesnel, P. Ciarlet, Jr. (2014). T-coercivity for the Maxwell problem with sign-changing coefficients. *Communications in Partial Differential Equations*, **79**, 29-41.



70. P. Ciarlet, Jr., C. Stohrer (2014). Finite element heterogeneous multiscale method for the Helmholtz equation. *C. R. Acad. Sci. Paris, Ser. I*, **352**, 755-760.
71. Philippe Ciarlet, P. Ciarlet, Jr., S. Sauter, C. Simian (2016). Intrinsic finite element methods for the computation of fluxes for Poisson's equation. *Numer. Math.*, **132**, 433-462.
72. P. Ciarlet, Jr. (2016). On the approximation of electromagnetic fields by edge finite elements. Part 1: sharp interpolation results for low-regularity fields. *Computers Math. Applic.*, **71**, 85-104.
73. A.-S. Bonnet-Ben Dhia, C. Carvalho, L. Chesnel, P. Ciarlet, Jr. (2016). On the use of Perfectly Matched Layers at corners for scattering problems with sign-changing coefficients. *J. Comput. Phys.*, **322**, 224-247.
74. C. Carvalho, L. Chesnel, P. Ciarlet, Jr. (2017). Eigenvalue problems with sign-changing coefficients. *C. R. Acad. Sci. Paris, Ser. I*, **355**, 671-675.
75. P. Ciarlet, Jr., S. Fliss, C. Stohrer (2017). On the approximation of electromagnetic fields by edge finite elements. Part 2: A Heterogeneous Multiscale Method for Maxwell's equations. *Computers Math. Applic.*, **73**, 1900-1919.
76. P. Ciarlet, Jr., E. Jamelot, F. D. Kpadonou (2017). Domain Decomposition Methods for the diffusion equation with low-regularity solution. *Computers Math. Applic.*, **74**, 2369-2384.
77. S. Chaillat, P. Ciarlet, Jr., L. Desiderio (2017). Theory and implementation of  $\mathcal{H}$ -matrix based iterative and direct solvers for Helmholtz and elastodynamic oscillatory kernels. *J. Comput. Phys.*, **351**, 165-186.
78. A.-S. Bonnet-Ben Dhia, C. Carvalho, P. Ciarlet, Jr. (2018). Mesh requirements for the finite element approximation of problems with sign-changing coefficients. *Numer. Math.*, **138**, 801-838.
79. P. Ciarlet, Jr., C. Dunkl, S. Sauter (2018). A family of Crouzeix-Raviart Finite Elements in 3D. *Analysis and Applications*, **16**, 649-691.
80. P. Ciarlet, Jr., L. Giret, E. Jamelot, F. D. Kpadonou (2018). Numerical analysis of the mixed finite element method for the neutron diffusion eigenproblem with heterogeneous coefficients. *Math. Mod. Num. Anal.*, **52**, 2003-2035.
81. P. Ciarlet, Jr., M. Vohralik (2018). Localization of global norms and robust a posteriori error control for transmission problems with sign-changing coefficients. *Math. Mod. Num. Anal.*, **52**, p. 2037-2064.
82. J. P. Borthagaray, P. Ciarlet, Jr. (2019). On the convergence in  $H^1$ -norm for the fractional Laplacian. *SIAM J. Numer. Anal.*, **57**, p. 1723-1743.
83. M. Campos Pinto, P. Ciarlet Jr., B. Després, A. Nicolopoulos (2020). Degenerate elliptic equations for resonant wave problems. *IMA J. Applied Math.*, **85**, p. 132-159.
84. S. Chaillat, P. Ciarlet, Jr., F. D. Kpadonou (2020). On the efficiency of nested GMRES preconditioners for 3D acoustic and elastodynamic  $\mathcal{H}$ -matrix accelerated Boundary Element Methods. *Computers Math. Applic.*, **80**, p. 471-489.
85. P. Ciarlet, Jr. (2020). On the approximation of electromagnetic fields by edge finite elements. Part 3: sensitivity to coefficients. *SIAM J. Math. Anal.*, **52**, p. 3004-3038.
86. D. Chicaud, P. Ciarlet, Jr., A. Modave (2021). Analysis of variational formulations and low-regularity solutions for time-harmonic electromagnetic problems in complex anisotropic media. *SIAM J. Math. Anal.*, **53**, p. 2691-2717.

87. C. Carvalho, P. Ciarlet, Jr., C. Scheid (2022). Limiting amplitude principle and resonances in plasmonic structures with corners: numerical investigation. *Comput. Methods Appl. Mech. Engrg.*, **388**, 114207.
88. S. Chaillat, P. Ciarlet, Jr., L. Bagur (2022). Improvement of hierarchical matrices for 3D elastodynamic problems with a complex wavenumber. *Adv. Comput. Math.*, **48**, article number 9.
89. P. Ciarlet, Jr., M. Kachanovska (2022). A mathematical study of a hyperbolic metamaterial in free space. *SIAM J. Math. Anal.*, **54**, p. 2216-2250.
90. P. Ciarlet, Jr. (to appear). On the approximation of electromagnetic fields by edge finite elements. Part 4 : analysis of the model with one sign-changing coefficient. *Numer. Math.*.
91. P. Ciarlet, Jr., M.-H. Do, F. Madiot (to appear). A posteriori error estimates for mixed finite element discretizations of the Neutron Diffusion equations. *Math. Mod. Num. Anal.*.

#### PUBLICATIONS IN REFEREED PROCEEDINGS

1. P. Ciarlet, Jr. (1993). *A comparison of three iterative algorithms based on domain decomposition methods*. In 7th Conf. on Domain Decomposition Methods, 1993, D. E. Keyes and J. Xu, Eds, Contemporary Mathematics, **180**, p. 387-393.
2. Ciarlet, Jr., F. Lamour, B. F. Smith (1995). *On the influence of the partitioning schemes on the efficiency of overlapping domain decomposition methods*. In FRONTIERS'95: 5th Symp. on the frontiers of massively parallel computation, IEEE, p. 375-384.
3. F. Assous, P. Ciarlet, Jr., S. Labrunie, S. Lohrengel (2002). *The singular complement method*. In 13th Conf. on Domain Decomposition Methods, 2000, N. Debit et al, Eds, CIMNE, Barcelona, p. 161-189.
4. P. Ciarlet, Jr., E. Jamelot (2006). *Continuous Galerkin methods for solving Maxwell equations in 3D geometries*. In ENUMATH 2005, Santiago de Compostela, Espagne, Springer, p. 547-554.
5. F. Assous, P. Ciarlet, Jr. (2006). *Vlasov-Maxwell simulations in singular geometries*. In ICCS'06, Reading, UK, Part IV, Lecture Notes in Computer Science, **3994**, Springer, p. 623-630.
6. F. Assous, P. Ciarlet, Jr. (2008). *A multiscale approach for solving Maxwell's equations in waveguides with conical inclusions*. In ICCS'08, Cracovie, Pologne, Part II, Lecture Notes in Computer Science, **5102**, Springer, p. 331-340.
7. A.-S. Bonnet-Ben Dhia, C. Carvalho, L. Chesnel, P. Ciarlet, Jr. (2013). *Plasmonic cavity modes: black-hole phenomena captured by Perfectly Matched Layers*. In PIERS 2013, Stockholm, Sweden, The Electromagnetics Company, p. 638-642.
8. E. Jamelot, P. Ciarlet, Jr., A.-M. Baudron, J.-J. Lautard (2014). *Domain decomposition for the neutron  $SP_N$  equations*. In DDM'21, Lecture Notes in Computational Science and Engineering, 98, Springer, p. 677-685, 2012.
9. P. Ciarlet, Jr., L. Giret, E. Jamelot, (2017). *Criticality computation with finite element method on non-conforming meshes*. In M&C 2017, Jeju, Korea.

10. J. P. Borthagaray, P. Ciarlet, Jr. (2017). *Nonlocal models for interface problems between dielectrics and metamaterials*. In 11th International Congress on Engineered Materials Platforms for Novel Wave Phenomena (Metamaterials), IEEE, p. 61-63.
11. S. Chaillat, P. Ciarlet, Jr., F. D. Kpadonou (2019). *An efficient preconditioner for  $\mathcal{H}$ -matrix accelerated Boundary Element Methods for 3D wave propagation problems*. In CSMA 2019.
12. M.-H. Do, P. Ciarlet, Jr., F. Madiot (2020). *Adaptive solution of the neutron diffusion equation with heterogeneous coefficients using the mixed finite element method on structured meshes*. In PHYSOR 2020.

## MONOGRAPH

F. Assous, P. Ciarlet, Jr., S. Labrunie (2018). *Mathematical Foundations of Computational Electromagnetism*. Applied Mathematical Sciences Series, Vol. 198, Springer, ISBN 978-3-319-70841-6.

## TEXTBOOKS

P. Ciarlet, Jr., E. Lunéville (2009). *The Finite Element Method. From Theory to Practice. I. General Concepts (In French)*. Les Presses de l'ENSTA, Coll. Les Cours, 188 pages.

E. Bécache, P. Ciarlet, Jr., C. Hazard, E. Lunéville (2010). *The Finite Element Method. From Theory to Practice. II. Complements (In French)*. Les Presses de l'ENSTA, Coll. Les Cours, 288 pages.

P. Ciarlet, Jr., E. Lunéville (2022). *The Finite Element Method. From Theory to Practice (In French)*. Editions ISTE, 382 pages.

## INVITED TALKS TO CONFERENCES

- 1st Singular Days, Lyon (Nov. 1996)
- 5èmes JEDP, Valenciennes (Sep. 2003)
- 4th Singular Days, Pont-à-Mousson (Jun. 2004)
- 17th Chemnitz FEM Symposium, Chemnitz, Germany (Sep. 2004)
- 5th Singular Days, Luminy (Apr. 2007)
- Journées Singulières Augmentées, Rennes (Aug. 2013)
- Numerical PDEs and their applications, Wuhan, China (May 2015)
- Analysis and numerics of acoustic and electromagnetic problems, Linz, Austria (Oct. 2016)
- Optimization in Scientific Computing, Hong Kong, China (Jun. 2017)
- Recent Advances in Computational and Applied Mathematics, Wuhan, China (Dec. 2017)
- 12th Workshop on Analysis and Advanced Numerical Methods for PDEs, Strobl, Austria (Jul. 2019)
- 9th Singular Days, Kassel, Germany (Sep. 2019)
- Numerical Waves, Nice (Oct. 2021)
- PDEs, Analysis and Applications, Valenciennes (Nov. 2021)
- ACOMEN, Liège, Belgium (Aug.-Sep. 2022)

## INVITED COLLOQUIUMS AND SEMINAR TALKS

- **France:** Evry Univ. (06/1995), Ecole Polytechnique (12/1996), CRESPO Seminar at INRIA (11/1997), Ecole Centrale de Lyon (06/2003), Paris 11 Univ. (04/2004), Paris 6 Univ. (02/2005), Rennes Univ. (03/2008), Nancy Univ. (06/2008), Grenoble Univ. (11/2008), Nice Univ. (04/2011), Paris 6 Univ. (06/2011), Nancy Univ. (04/2012), INRIA Sophia-Antipolis (04/2013), ENS Rennes (11/2014), INRIA Paris (05/2017), GdR MaNu (11/2017), Lorraine Univ. (01/2018), GdR Ondes (03/2018), Pau Univ. (05/2018), Versailles-St-Quentin-en-Yvelines Univ. (02/2019), Sorbonne Univ. (02/2019), Laboratoire de Mécanique et d'Acoustique, Marseille (10/2019), Séminaire INRIA (12/2021).
- **Europe:** Univ. of Pavia, Italy (10/1998), Univ. of Chemnitz, Germany (11/2001), Univ. of Zürich, Switzerland (01/2006), Univ. of Zürich, Switzerland (04/2008), Univ. of Zürich, Switzerland (03/2012), Univ. of Padova, Italy (Online - 03/2021).
- **Other Locations:** Univ. of Southern California, USA (03/1994), Chinese Univ. of Hong Kong, China (05/1996), Univ. of Houston, USA (09/2001), Univ. of Houston, USA (03/2002), Chinese Univ. of Hong Kong, China (04/2007).