

# Théophile Chaumont-Frelet

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## Research interests

Partial differential equations  
Numerical analysis  
Finite element methods  
Multiscale methods

High performance computing  
Wave propagation  
Geophysics  
Electromagnetism

## Professional history

- Since 2018: **Junior researcher** Inria project-team Atlantis  
Sophia-Antipolis, France
- 2018 - 2018: **Postdoctoral fellow** CERMICS  
Paris, France  
Supervision: Alexandre Ern, Virginie Ehrlacher and Anthony Nouy
- 2016 - 2018: **Postdoctoral fellow** Basque Center for Applied Mathematics  
Bilbao, Spain  
Supervision: David Pardo
- 2012 - 2015: **PhD Student** INSA Rouen and Inria project-team Magique3D  
Rouen, France  
Supervision: Christian Gout and Hélène Barucq

## Education

- 2007 - 2012: **Engineering degree** Insa Rouen  
Rouen, France
- 2011 - 2012: **Master's degree** University of Rouen  
Rouen, France

## Publications

- [1] T. Chaumont-Frelet, A. Ern, and M. Vohralík. *On the derivation of guaranteed and  $p$ -robust a posteriori error estimates for the Helmholtz equation*. Numer. Math. **in press** (2021). preprint: [hal-02202233](#). doi: [10.1007/s00211-021-01192-w](#).
- [2] T. Chaumont-Frelet and B. Verfürth. *A generalized finite element method for problems with sign-changing coefficients*. ESAIM Math. Model. Numer. Anal. **55** (2021), no. 3, 939–967. preprint: [hal-02496832](#). doi: [10.1051/m2an/2021007](#).
- [3] T. Chaumont-Frelet, A. Ern, and M. Vohralík. *Polynomial-degree-robust  $H(\text{curl})$ -stability of discrete minimization in a tetrahedron*. C. R. Math. Acad. Sci. Paris **358** (2020), no. 9–10, 1101–1110. preprint: [hal-02631319](#). doi: [10.5802/crmath.133](#).
- [4] V. Darrigrand, D. Pardo, T. Chaumont-Frelet, I. Gomez-Revuelto, and L.E. Garcia-Castillo. *A painless automatic hp-adaptive strategy for elliptic problems*. Finite Elem. Anal. Des. **178** (2020), 103424. preprint: [hal-02071427](#). doi: [10.1016/j.finel.2020.103424](#).
- [5] T. Chaumont-Frelet and F. Valentin. *A multiscale hybrid-mixed method for the Helmholtz equation in heterogeneous domains*. SIAM J. Numer. Anal. **58** (2020), no. 2, 1029–1067. preprint: [hal-01698914](#). doi: [10.1137/19M1255616](#).
- [6] T. Chaumont-Frelet, S. Nicaise, and J. Tomezyk. *Uniform a priori estimates for elliptic problems with impedance boundary conditions*. Comm. Pure Appl. Anal. **19** (2020), no. 5, 2445–2471. preprint: [hal-01887269](#). doi: [10.3934/cpaa.2020107](#).
- [7] T. Chaumont-Frelet and S. Nicaise. *Wavenumber explicit convergence analysis for finite element discretizations of general wave propagation problems*. IMA J. Numer. Anal. **40** (2020), 1503–1543. preprint: [hal-01685388](#). doi: [10.1093/imanum/drz020](#).
- [8] T. Chaumont-Frelet. *Mixed finite element discretizations of acoustic Helmholtz problems with high wavenumbers*. Calcolo **in press** (2019). preprint: [hal-02197891](#). doi: [10.1007/s10092-019-0346-z](#).
- [9] T. Chaumont-Frelet, M. Shahriari, and D. Pardo. *Adjoint-based formulation for computing derivatives with respect to bed boundary positions in resistivity geophysics*. Comput. Geosci. **23** (2019), 583–594. preprint: [hal-01790697](#). doi: [10.1007/s10596-019-9808-2](#).
- [10] T. Chaumont-Frelet and S. Nicaise. *High-frequency behaviour of corner singularities in Helmholtz problems*. ESAIM Math. Model. Numer. Anal. **5** (2018), 1803–1845. preprint: [hal-01706415](#). doi: [10.1051/m2an/2018031](#).
- [11] T. Chaumont-Frelet, D. Pardo, and Á. Rodríguez-Rozas. *Finite element simulations of logging-while-drilling and extra-deep azimuthal resistivity measurements using non-fitting grids*. Comput. Geosci. **22** (2018), 1161–1174. preprint: [hal-01706455](#). doi: [10.1007/s10596-018-9744-6](#).
- [12] T. Chaumont-Frelet, S. Nicaise, and D. Pardo. *Finite element approximation of electromagnetic fields using nonfitting meshes for Geophysics*. SIAM J. Numer. Anal. **56** (2018), no. 4, 2288–2321. preprint: [hal-01706452](#). doi: [10.1137/16m1105566](#).

- [13] H. Barucq, T. Chaumont-Frelet, and C. Gout. *Stability analysis of heterogeneous Helmholtz problems and finite element solution based on propagation media approximation*. Math. Comp. **86** (2017), no. 307, 2129–2157.  
preprint: [hal-01408934](#). doi: [10.1090/mcom/3165](#).
- [14] T. Chaumont-Frelet. *On high order methods for the heterogeneous Helmholtz equation*. Comp. Math. Appl. **72** (2016), 2203–2225.  
preprint: [hal-01408943](#). doi: [10.1016/j.camwa.2016.08.026](#).
- [15] H. Barucq, T. Chaumont-Frelet, J. Diaz, and V. Péron. *Upscaling for the Laplace problem using a discontinuous Galerkin method*. J. Comput. Appl. Math. **240** (2013), 192–203.  
preprint: [hal-00757098](#). doi: [10.1016/j.cam.2012.05.025](#).

## Prepublications

- [16] T. Chaumont-Frelet, A. Ern, S. Lemaire, and F. Valentin. *Bridging the multiscale hybrid-mixed and multiscale hybrid high-order methods*.  
preprint: [hal-03235525](#).
- [17] T. Chaumont-Frelet, S. Lanteri, and P. Vega. *A posteriori error estimates for finite element discretizations of time-harmonic Maxwell's equations coupled with a non-local hydrodynamic Drude model*.  
preprint: [hal-03164225](#).
- [18] T. Chaumont-Frelet and P. Vega. *Frequency-explicit a posteriori error estimates for finite element discretizations of Maxwell's equations*.  
preprint: [hal-02943386](#).
- [19] T. Chaumont-Frelet and P. Vega. *Frequency-explicit approximability estimates for time-harmonic Maxwell's equations*.  
preprint: [hal-03221188](#).
- [20] G. Nehmetallah, T. Chaumont-Frelet, S. Descombes, and S. Lanteri. *A postprocessing technique for a discontinuous Galerkin discretization of time-dependent Maxwell's equations*.  
preprint: [hal-02956882](#).
- [21] T. Chaumont-Frelet and M. Vohralík. *Equivalence of local-best and global-best approximations in  $H(\text{curl})$* .  
preprint: [hal-02736200](#).
- [22] T. Chaumont-Frelet, A. Ern, and M. Vohralík. *Stable broken  $H(\text{curl})$  polynomial extensions and  $p$ -robust quasi-equilibrated a posteriori estimators for Maxwell's equations*.  
preprint: [hal-02644173](#).
- [23] T. Chaumont-Frelet, D. Gallistl, S. Nicaise, and J. Tomezyk. *Wavenumber explicit convergence analysis for finite element discretizations of time-harmonic wave propagation problems with perfectly matched layers*.  
preprint: [hal-01887267](#).

## Editorial activities

**Guest editor** for Geosciences:

Special issue “Petroleum Engineering Applications: Borehole Simulations”

**Reviewer** for the journals:

Comput. Geosci.; Comput. Math. Appl.; ESAIM Math. Model. Numer. Anal.;

Math. Meth. Appl. Sci.; Geophys. J. Int.;