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 and P. Vega. *Frequency-explicit a posteriori error estimates for finite element discretizations of Maxwell's equations*. SIAM J. Numer. Anal. **60** (2022), no. 4, 774–1798.
preprint: hal-02943386. doi: 10.1137/21M1421805.

[2] T. Chaumont-Frelet and P. Vega. *Frequency-explicit approximability estimates for time-harmonic Maxwell's equations*. Calcolo **59** (2022), article number: 22.
preprint: hal-03221188. doi: 10.1007/s10092-022-00464-7.

[3] T. Chaumont-Frelet, A. Ern, and M. Vohralík. *Stable broken $H(curl)$ polynomial extensions and p-robust a posteriori error estimates by broken patchwise equilibration for the curl–curl problem*. Math. Comp. **91** (2022), 37–74.
preprint: hal-02644173. doi: 10.1090/mcom/3673.

[4] 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*. Commun. Math. Sci. **20** (2022), no. 1, 1–52.
preprint: hal-01887267. doi: 10.4310/CMS.2022.v20.n1.a1.

[5] 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*. Comput. Meth. Appl. Engrg. **385** (2021), 114002.
preprint: hal-03164225. doi: 10.1016/j.cma.2021.114002.

[6] T. Chaumont-Frelet, A. Ern, S. Lemaire, and F. Valentin. *Bridging the multiscale hybrid-mixed and multiscale hybrid high-order methods*. ESAIM Math. Model. Numer. Anal. **56** (2021), no. 1, 261–285.
preprint: hal-03235525. doi: 10.1051/m2an/2021082.

[7] T. Chaumont-Frelet and M. Vohralík. *Equivalence of local-best and global-best approximations in H(curl)*. Calcolo **58** (2021).
preprint: hal-02736200. doi: 10.1007/s10092-021-00430-9.

[8] 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. **148** (2021), 525–573.
preprint: hal-02202233. doi: 10.1007/s00211-021-01192-w.

[9] 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.

[10] T. Chaumont-Frelet, A. Ern, and M. Vohralík. *Polynomial-degree-robust H(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.

[11] V. Darrigrand, D. Pardo, T. Chaumont-Frelet, I. Gomez-Revuelto, and L.E. Garcia-Castillo. *A painless automatic hp-adatptive strategy for elliptic probems*. Finite Elem. Anal. Des. **178** (2020), 103424.
preprint: hal-02071427. doi: 10.1016/j.finel.2020.103424.

[12] 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.

[13] 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.

[14] 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.
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[15] T. Chaumont-Frelet. *Mixed finite element discretizations of acoustic Helmholtz problems with high wavenumbers*. Calcolo **56** (2019), no. 49.
preprint: hal-02197891. doi: 10.1007/s10092-019-0346-z.

[16] T. Chaumont-Frelet, M. Shahriari, and D. Pardo. *Adjoint-based formulation for computing derivaties 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.

[17] 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.

[18] 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.

[19] 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.

[20] 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.

[21] 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.

[22] 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

[23] T. Chaumont-Frelet, V. Dolean, and M. Ingremeau. *Efficient approximation of high-frequency Helmholtz solutions by Gaussian coherent states*.
preprint: hal-03747290.

[24] T. Chaumont-Frelet and M. Ingremeau. *Decay of coefficients and approximation rates in Gabor Gaussian frames*.
preprint: hal-03746979.

[25] T. Chaumont-Frelet and P. Vega. *Frequency-explicit a posteriori error estimates for discontinuous Galerkin discretizations of Maxwell's equations*.
preprint: hal-03744230.

[26] T. Chaumont-Frelet. *Asymptotically constant-free and polynomial-degree-robust a posteriori estimates for space discretizations of the wave equation.*
preprint: hal-03632468.

[27] T. Chaumont-Frelet and E. Spence. *Scattering by finely-layered obstacles: frequency-explicit bounds and homogenization.*
preprint: hal-03354770.

[28] T. Chaumont-Frelet. *A simple equilibration procedure leading to polynomial-degree-robust a posteriori error estimators for the curl-curl problem.*
preprint: hal-03323859.

[29] T. Chaumont-Frelet, M.J. Grote, S. Lanteri, and J.H. Tang. *A controllability method for Maxwell's equations.*
preprint: hal-03250886.

[30] 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.

[31] T. Chaumont-Frelet and M. Vohralík. *p-robust equilibrated flux reconstruction in H(curl) based on local minimizations. Application to a posteriori analysis of the curl-curl problem.*
preprint: hal-03227570.

Editorial activities

Guest editor for Geosciences:
Special issue "Petroleum Engineering Applications: Borehole Simulations"

Reviewer for the journals:
Math. Comp.; SIAM J. Numer. Anal.; SIAM J. Sci. Comput.; ESAIM Math. Model. Numer. Anal.; Comput. Geosci.; Comput. Math. Appl.; Math. Meth. Appl. Sci.; Geophys. J. Int.;