Fatih Ecevit

ASSOCIATE PROFESSOR

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Research Interests

Numerical analysis, partial differential equations, microlocal analysis, high-frequency scattering problems, asymptotic analysis

Work Experience

Oct. 2018 -	Associate Professor	Department of Mathematics, Boğaziçi University, Istanbul, Turkey
Sept. 2017 - July 2019	Vice Dean	Faculty of Rats and Sciences, Boğaziçi University, Istanbul, Turkey
Dec. 2010 - Sept. 2018	Assistant Professor	Department of Mathematics, Boğaziçi University, Istanbul, Turkey
Sept. 2007 - Nov. 2010	Teaching Associate	Department of Mathematics, Boğaziçi University, Istanbul, Turkey
Sept. 2005 - Aug. 2007	Postdoctoral Research Associate	Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany
Sept. 2001 - Aug. 2005	Research Assistant	School of Mathematics, University of Minnesota, Twin Cities, USA
Sept. 1999 - May 2003	Teaching Assistant	School of Mathematics, University of Minnesota, Twin Cities, USA
Aug. 2002 - Sept. 2002	Leading Teaching Assistant	Center for Teaching and Learning Services Intl. Teaching Assistant Orientation Program, University of Minnesota, Twin Cities, USA
Sept. 1995 - July 1999	Teaching Assistant	Department of Mathematics, Boğaziçi University, Istanbul, Turkey
Sept. 1993 - June 1995	Undergraduate Teaching Assistant	Department of Mathematics, Boğaziçi University, Istanbul, Turkey

Education

University of Minnesota Twin Cities, USA	Mathematics	PhD. 1999-2005 Thesis Title: Integral equation formulations of electromagnetic and acoustic scattering problems: high-frequency asymptotic expansions and convergence of multiple scattering iterations Advisor: Fernando Reitich
Boğaziçi University Istanbul, Turkey	Mathematics	MS. 1995-1998 Thesis Title: Weakly compact bilinear forms and applications to Banach algebras Advisor: Nilgün Işık
Boğaziçi University Istanbul, Turkey	Mathematics	BS. 1990-1995

Honors and Awards

2005	Teaching Assistant Award	School of Mathematics, University of Minnesota, Twin Cities, USA
2000-2001-2002 2003-2004-2005	Graduate Student Summer Fellowship	School of Mathematics, University of Minnesota, Twin Cities, USA
Jan. 1998 - July 1999	Integrated PhD Program Fellowship	Scientific and Technological Research Association of Turkey (TÜBİTAK)

Refereed Journal Publications

[12] F. Ecevit, Y. Boubendir, A. Anand and S. Lazergui, "*Spectral Galerkin boundary element methods for high-frequency sound-hard scattering problems," Numer*. Math. **150**(3) (2022) 803-847. **SCI**

[11] A. Boysal, F. Ecevit and C.Y. Yıldırım, "*Asymptotic evaluation of a lattice sum associated with the Laplacian matrix,"* Anal. Math. **48**(3) (2022) 649-682. **SCI-E**

[10] F. Ecevit, A. Anand and Y. Boubendir, "*Galerkin boundary element methods for high-frequency multiple-scattering problems," J. Sci. Comput.* **83**(1) (2020) Paper No. 1, 1-21. **SCI**

[9] F. Ecevit and H.H. Eruslu, "A *Galerkin BEM for high-frequency scattering problems based on frequency-dependent changes of variables," IMA J. Numer. Anal.* **39**(2) (2019) 893-923. **SCI**

[8] A. Boysal, F. Ecevit and C.Y. Yıldırım, "*A lattice sum involving the cosine function,"* J. Math. Anal. Appl. **463**(1) (2018) 134-160. **SCI**

[7] F. Ecevit,"*Frequency independent solvability of surface scattering problems,"* Turkish J. Math., **42**, No:2 (2018) 407-422. **SCI-E**

[6] Y. Boubendir, F. Ecevit and F. Reitich, "*Acceleration of an iterative method for the evaluation of high-frequency multiple-scattering effects,"* SIAM J. Sci. Comput., **39**, No:6 (2017), pp. B1130-B1155. **SCI**

[**5**] F. Ecevit and H.Ç. Özen, "*Frequency-adapted Galerkin boundary element methods for convex scattering problems,"* Numer. Math., **135**, No:1 (2017), 27-71. **SCI**

[4] E. Duman, F. Ecevit, Ç. Çakır and O. Altan, "*A novel collection optimization solution maximizing long-term profits: a case study in an international bank,"* Journal of Decision Systems, **26**(4) (2017), 328-340. **Web of Science & Scopus**

[3] A. Anand, Y. Boubendir, F. Ecevit and F. Reitich, "*Analysis of multiple scattering iterations for high-frequency scattering problems. II: The three dimensional scalar case,"* Numer. Math., **114**, No:3 (2010), 373-427. **SCI**

[2] F. Ecevit and F. Reitich, "*Analysis of multiple scattering iterations for high-frequency scattering problems. I: The two dimensional case,"* Numer. Math., **114**, No:2 (2009), 271-354. **SCI**

[1] F. Ecevit, "*Asymptotic expansions of multiply scattered surface currents,"* Proc. Appl. Math. Mech. **7** (2007), 1022701–1022702. **INSPEC (IET)**

Technical Reports

[5] F. Ecevit, "*A survey on high-frequency scattering relating to smooth convex scatterers,"* Oberwolfach Reports, (2022), to appear

[4] F. Ecevit, "*Convergent scattering algorithms,"* Oberwolfach Reports, No. 10 (2010), 31–35.

[3] F. Ecevit, "*Analysis of boundary element methods for high-frequency scattering problems,"* Oberwolfach Reports, No. 19 (2008), 48–51.

[2] A. Anand, Y. Boubendir, F. Ecevit and F. Reitich, "*Analysis of multiple scattering iterations for high-frequency scattering problems. II: The three dimensional scalar case,"* Max Planck Institute for Mathematics in the Sciences, Preprint 147 (2006), 1–27.

[1] F. Ecevit and F. Reitich, "*Analysis of multiple scattering iterations for high-frequency scattering problems. I: The two dimensional case,"* Max Planck Institute for Mathematics in the Sciences, Preprint 137 (2006), 1–37.

Conference Proceedings

[7] F. Ecevit, A. Anand, Y. Boubendir, and S. Lazergui, "*Galerkin boundary element methods for high-frequency sound-hard scattering problems,"* Proceedings of the 14th International Conference on Mathematical and Numerical Aspects of Wave Propagation, Vienna, Austria (2019), 384–385, DOI: 10.34726/waves2019

[6] F. Ecevit, Y. Boubendir and S. Lazergui, "*Efficient boundary element methods for the solution of high-frequency convex scattering problems,"* Proceedings of the 13th International Conf. on Mathematical and Numerical Aspects of Wave Propagation, University of Minnesota, MN USA (2017), 117–118.

[5] Y. Boubendir, F. Ecevit and F. Reitich, "*High-frequency scattering problems*: *An appropriate preconditioner for a Krylov subspace algorithm,"* Proceedings of the 9th International Conf. on Mathematical and Numerical Aspects of Wave Propagation, Pau, France (2009), 264–265.

[4] F. Ecevit and F. Reitich, *"Uniform asymptotic expansions of multiple scattering iterations,"* Proceedings of the 9th International Conference on Mathematical and Numerical Aspects of Wave Propagation, Pau, France (2009), 130–131.

[3] Y. Boubendir, F. Ecevit and F. Reitich, *"Krylov subspace based acceleration strategies for the solution of high-frequency multiple scattering problems,"* Proceedings of the 8th International Conference on Mathematical and Numerical Aspects of Wave Propagation, University of Reading, UK (2007), 41–43.

[2] F. Ecevit and F. Reitich, *"Decay of multiple scattering iterates for trapping obstacles in the high-frequency regime,"* Proc. of Int.Association of BEM, Graz, Austria (2006), 177–180.

[1] F. Ecevit and F. Reitich, *"A high-frequency integral equation method for electromagnetic/acoustic scattering simulations: rate of convergence of multiple scattering iterations,"* Proceedings of the 7th International Conf. on Mathematical and Numerical Aspects of Wave Propagation, Brown University, Providence, RI USA (2005), 145–147.

Reseacrh Projects

[4] *"Asymptotic expansion of a lattice sum,"* BAP/17B06P3, Araştırmacı, (2017-2020).

[3] *"Yüksek frekanslı saçılım problemleri için hibrit integral denklem metotları,"* TÜBİTAK/1001 117F056, Yürütücü, (2017-2020).

[2] *"Gecikmeli alacaklar için tahsilat optimizasyonu,"* TÜBİTAK/Teydeb 3130446, Danışman, (06/2013-04/2015).

[1] *"Yüksek Frekanslı Akustik Dalga Saçılımı İçin Hızlı ve Yakınsak Sayısal Metotlar,"* BAP/5548P,
Yürütücü, *(06/29*/2010-06/29/2012).

Invited Research Visits

[10] Workshop on *"At the Interface between Semiclassical Analysis and Numerical Analysis of Wave Scattering Problems,"* Mathematisches Forschungsinstitut Oberwolfach (MFO), Germany (September 25 - October 1, 2022).

[9] New Jersey Institute of Technology (August 20-September 1, 2018).

[8] New Jersey Institute of Technology (May 29-June 4, 2016).

[7] Indian Institute of Technology Kanpur, Kanpur, India (January 20-24, 2014).

[6] Advanced Workshop on *"Computational Methods for Integral Equations and Applications,"* Indian Institute of Technology Kanpur, Kanpur, India (January 13-17, 2014).

[5] Workshop on *"Computational Electromagnetics and Acoustics,"* Mathematisches Forschungsinst. Oberwolfach (MFO), Germany (February 14-20, 2010).

[4] Workshop on *"Analysis of Boundary Element Methods,"* Mathematisches Forschungsinstitut Oberwolfach (MFO), Germany (April 19-23, 2008).

[3] Semester on *"Highly Oscillatory Problems"*, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK (June 18-July 7, 2007).

[2] Semester on *"Highly Oscillatory Problems"*, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK (March 2-13, 2007).

[1] Bath Institute for Complex Systems, University of Bath, UK (September 11-15, 2006).

Conferences Organized

"Integral equation methods for high-frequency scattering problems," Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany, January 25-27, 2007.

Presentations

[40] *"A survey on high-frequency scattering relating to smooth convex scatterers,"* At the Interface between Semiclassical Analysis and Numerical Analysis of Wave Scattering Problems, Mathematisches Forschungsinstitut Oberwolfach (MFO), Germany (September 28, 2022) **Invited**

[39] *"Galerkin boundary element methods for high-frequency sound-hard scattering problems,"* Scattering and Propagation of Waves: theoretical and computational challenges, A workshop celebrating Simon Chandler-Wilde's 60th birthday, University of Reading, UK (June 28, 2022) **Invited**

[38] *"Galerkin boundary element methods for high-frequency sound-hard scattering problems,"* Conference on Mathematics of Wave Phenomenon, Karlsruhe Institute of Technology, Germany (February 16, 2022)

[37] *"Galerkin boundary element methods for high-frequency sound-hard scattering problems,"* Proceedings of the 14th International Conference on Mathematical and Numerical Aspects of Wave Propagation, TU Wien, Vienna, Austria (August 29, 2019)
[36] *"Hybrid numerical-asymptotic integral equation methods for high-frequency scattering problems: frequency independent solvability and acceleration,"* University of Warmia and Mazury, Olsztyn, Poland (October 4, 2018)
[35] *"Hybrid numerical-asymptotic integral equation methods for high-frequency scattering problems: frequency independent solvability and acceleration,"* Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology (August 24, 2018) **Invited**
[34] *"Efficient boundary element schemes for the solution of high-frequency convex scattering problems,"* 13th International Conf. on Mathematical and Numerical Aspects of Wave Propagation, University of Minnesota, MN USA (May 16, 2017)
[33] *"Frequency-adapted-boundary element methods for single-scattering problems,"* Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology (June 3, 2016) **Invited**
[32] *"Frequency-adapted-boundary element methods for single-scattering problems,"* Gebze Technical University (May 13, 2016) **Invited**
[31] *"Optimized boundary element methods for scattering problems,"* Conference on Structured Matrices and Tensors: Analysis, Algorithms, and Applications, National Taiwan University, Taipei (Dec. 10, 2014) **Invited**
[30] *"New boundary element methods for multiple scattering problems,"* International Conference: Mathematics Days in Sofia, Bulgaria (July 9, 2014) **Invited**
[29] *"Novel boundary element methods for multiple scattering problems,"* Indian Institute of Technology Kanpur, India (January 20-24, 2014) **Invited**
[28] *"Steps towards the O(1) holy-grail: O(k^a) solution scattering problems,"* Indian Institute of Technology Kanpur, India (January 20-24, 2014) **Invited**
[27] *"Robust numerical methods for scattering problems,"* Istanbul Technical University, Department of Mathematics Engineering Seminar (March 5, 2010) **Invited**
[26] *"Convergent high-frequency algorithms for single and multiple scattering,"* European Science Foundation Mathematics Conference on Highly-oscillatory problems: From theory to apps., Isaac Newton Inst. for Mathematical Sciences, University of Cambridge, UK (Sept. 9, 2010)
[25] *"Convergent scattering algorithms,"* Workshop on Computational electromagnetics and acoustics, Mathematisches Forschungsinstitut Oberwolfach (MFO), Germany (February 15, 2010) **Invited**
[24] *"High-frequency scattering problems*: *An appropriate preconditioner for a Krylov subspace algorithm,"* Proceedings of the 9th International Conf. on Mathematical and Numerical Aspects of Wave Propagation, Pau, France (June 18, 2009)
[23] *"Uniform asymptotic expansions of multiple scattering iterations,"* Proceedings of the 9th Int. Conf.on Mathematical and Numerical Aspects of Wave Propagation, Pau, France (June 15, 2009)
[22] *"Helmholtz equation: Computations, geometry and analysis,"* Istanbul Center for Mathematical Sciences (May 15, 2009) **Invited**
[21] *"High-frequency scattering: From theory to applications,"* Bilgi University (December 19, 2008) **Invited**
[20] *"State-of-the-art high-frequency scattering simulators,"* Feza Gürsey Institute (May 15, 2008) **Invited**
[19] *"State-of-the-art high-frequency scattering simulators,"* Department of Mathematics Colloquium, Doğuş University (April 25, 2008) **Invited**
[18] *"Analysis of boundary element methods for high-frequency scattering problems,"* Workshop on Analysis of Boundary Element Methods, Mathematisches Forschungsinstitut Oberwolfach (MFO), Germany (April 16, 2008) **Invited**
[17] *"Krylov subspace based acceleration strategies for the solution of high-frequency multiple scattering problems,"* 8th International Conference on Mathematical and Numerical Aspects of Waves, University of Reading, UK (July 27, 2007)
[16] *"Analysis of high-frequency multiple-scattering problems in 3D: the scalar acoustic and vector electromagnetic equations,"* ICIAM 07, 6th International Congress on Industrial and Applied Mathematics, ETH-Zurich, Switzerland (July 19, 2007)
[15] *"New Galerkin methods for high-frequency scattering simulations,"* Workshop on Effective Computational Methods for Highly Oscillatory Problems: The Interplay between Mathematical Theory and Applications, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK (July 2, 2007) **Invited**

[14] *"Asymptotics for high-frequency multiple scattering,"* One day Workshop on Oscillatory Integral Equations in High Frequency Scattering and Wave Propagation, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK (June 19, 2007) **Invited**
[13] *"High-frequency scattering by a collection of convex bodies,"* Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK (March 12, 2007) **Invited**
[12] *"High-frequency scattering by a collection of convex bodies,"* 23rd GAMM Seminar Leipzig, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany (January 27, 2007)
[11] *"Analysis of multiple scattering iterations for high-frequency scattering problems,"* Department of Mathematics Colloquium, Boğaziçi University, Istanbul, Turkey (December 27, 2006) **Invited**
[10] *"Analysis of multiple scattering iterations for high-frequency scattering problems,"* Science and Math-Sci Seminars, Koç University, Istanbul, Turkey (December 26, 2006) **Invited**
[9] *"The story behind high-frequency multiple scattering problems,"* Applied Mathematics and Numerical Analysis Seminar, Department of Mathematics, University of Reading, UK (September 14, 2006) **Invited**
[8] *"Analysis of multiple scattering iterations for high-frequency scattering problems,"* Bath Institute for Complex Systems, University of Bath, UK (September 11, 2006) **Invited**
[7] *"Analysis of multiple scattering iterates in the high-frequency regime,"* Zurich Summer School on High-Frequency Wave Propagation, ETH-Zurich, Switzerland (September 1, 2006) **Invited**
[6] *"Decay of multiple scattering iterates for trapping obstacles in the high-frequency regime,"* IABEM 2006, Graz, Austria (July 11, 2006) **Invited**
[5] *"High-frequency asymptotics and convergence of multiple scattering iterations in two-dimensional scattering problems (Poster),"* Advances in Computational Scattering, BIRS, Calgary, Canada (February 18-23, 2006)
[4] *"An efficient integral equation method for electromagnetic and acoustic scattering simulations: convergence of multiple scattering iterations,"* Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany (September 20, 2005) **Invited**
[3] *"A high-frequency integral equation method for electromagnetic and acoustic scattering simulations: rate of convergence of multiple scattering iterations,"* 7th International Conf. on Mathematical and Numerical Aspects of Waves, Brown University, RI, USA (June 23, 2005)
[2] *"An efficient integral equation method for electromagnetic and acoustic scattering simulations: convergence of multiple scattering iterations,"* Applied Mathematics and Numerical Analysis Seminar, School of Mathematics, University of Minnesota, USA (March 31, 2005) **Invited**
[1] *"A high-frequency integral equation method for electromagnetic and acoustic scattering simulations: rate of convergence of multiple scattering iterations,"* Atlanta National Conference, USA (January 7, 2005)

Referee for the Journals

Computing
IMA Journal of Numerical Analysis
Journal of Applied and Computational Mathematics
Journal of Mathematical Analysis and Applications
Numerische Mathematik
SIAM Journal on Applied Mathematics
SIAM Journal on Numerical Analysis

Academic Services

Math Department Colloquium Organizer from Sept. 2013-August 2015 (*with Özlem Beyarslan)*
Advisor for "af" students in Mathematics (2013-present)
Advisor for Graduate Students in Mathematics (Oct. 2021-present)
Faculty Member at the *Graduate Program in Computational Science and Engineering* (CSE)
Academic Rules Council Membership (Sept. 2017-July 2019)
Disciplinary Actions Central Committee Membership (Sept. 2017-July 2019)
University Student Representative Election Board Membership (Sept. 2017-July 2019)
Member of the Commission for Acceptance of Students Coming from Abroad (Sept. 2017-July 2019)

Master of Science Students Supervised

Rıdvan Özdemir [Ph.D. student at Auburn University]
Program: Mathematics
Thesis Title: Frequency independent evaluation of highly oscillatory integrals
Duration: Fall 2015 - Spring 2018

Mine Melodi Çalışkan [Ph.D. student at University of Tuebingen]
Program: Computational Science and Engineering
Thesis Title: Data stream analysis
Duration: Fall 2016 - Spring 2018

Betül Güvenç [Ph.D. student at Aalto University]
Program: Computational Science and Engineering
Thesis Title: Machine learning methods in natural language processing
Duration: Fall 2014 - Spring 2016

Ömer Aktepe [Ph.D. student at University of Arizona]
Program: Mathematics
Thesis Title: Efficient bases for the Galerkin solution of multiple-scattering problems
Duration: Fall 2013 - Spring 2016

Hasan Hüseyin Eruslu [Ph.D. University of Delaware (2020) - Software Engineer at Google, US]
Program: Mathematics
Thesis Title: An optimal change of variables scheme for single scattering problems
Duration: Fall 2012 - Spring 2015

Hasan Çağan Özen [Ph.D. Columbia University (2017) - Quantitative Strategist at Morgan Stanley, US]
Program: Computational Science and Engineering
Thesis Title: Robust high-frequency solvers
Duration: Fall 2009 - Spring 2012

Samet Keserci [Data Engineer at Amazon, US]
Program: Mathematics
Thesis Title: Analysis of convergent integral eqn. methods for high-frequency scattering
Duration: Fall 2009 - Spring 2012

Courses Offered at Boğaziçi University

[20] FE 586 – Numerical Methods in Finance (F ’08, F ’09, Sp ’11)
[19] Math 58X – Integral Equations (Sp ’11, F ’14)
[18] Math 588 – Selected Topics in Applied Mathematics (F ’10, Sp '20)
[17] Math 532 – Real Analysis II (Sp ’10, Sp '22)
[16] Math 531 – Real Analysis I (F ’09, F ’15, F '21)
[15] Math 48K – Applied Numerical Methods using Matlab (F ’08)
[14] Math 451 – Numerical Solutions of Differential Equations (F ’11, F ’14)
[13] Math 431 – Complex Analysis I (F ’15)
[12] Math 352 – Partial Differential Equations (F ’11, Sp ’16, F ’17)
[11] Math 343 – Probability (F ’08)
[10] Math 336 – Numerical Analysis (Sp ’09, Sp ’10, Sp ’11, Sp ’12, Sp ’13, Sp ’14, Sp ’16,Sp ’19, Sp '21, F '22)
[9] Math 234 – Advanced Calculus II (Sp ’17)
[8] Math 231 – Advanced Calculus I (F ’16)
[7] Math 224 – Linear Algebra I (Sp ’09, Sm ’09)
[6] Math 202 – Differential Eqns. (Sp’08,Sm’09,Sp’11,Sp’12,Sp’13,F’15, F’16,Sm’17,F’17,Sp’18)
[5] Math 201 – Matrix Theory (Sm ’10, Sm ’12, Sm ’13, F ’13, Sp ’14, Sp ’15, Sm ’16,Sp’17)
[4] Math 132 – Calculus for Mathematics Students II (F ’14, Sp '22)
[3] Math 131 – Calculus for Mathematics Students I (F ’09, F ’12, F '21)
[2] Math 102 – Calculus II (Sm ’08, F ’17, F '18, F '19, F '22)
[1] Math 101 – Calculus I (F ’07, F ’10, F ’11, Sp '21)