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Sönmez Şahutoğlu

Education

2006 **Ph.D.**, *Texas A&M University*, College Station, TX
Advisor: Emil Straube

2000 **M.S.**, *Middle East Technical University*, Ankara, Turkey

1997 **B.S.**, *Middle East Technical University*, Ankara, Turkey

Employment

2020 – - - - **Professor**, *University of Toledo*, Toledo, OH

2014 – 2020 **Associate Professor**, *University of Toledo*, Toledo, OH

2009 – 2014 **Assistant Professor**, *University of Toledo*, Toledo, OH

2007 – 2009 **RTG Assistant Professor**, *University of Michigan*, Ann Arbor, MI

2006 – 2007 **PostDoc Assistant Professor**, *University of Michigan*, Ann Arbor, MI

Research Visiting Positions

2017 Spring Sabanci University, Istanbul, Turkey

2013 Summer Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany

Current Research Interests

Several Complex Variables

The $\overline{\partial}$-problem and boundary geometry of pseudoconvex domains

Operator Theory

Hankel, Toeplitz, and composition operators in several complex variables

Grants

2025 Co-PI for NSF conference grant DMS-2501693 ($35,000) for Midwest Several Complex Variables Conference

2016 NSF conference grant DMS-1600121 ($33,000) for Midwest Several Complex Variables Conference

2010 Summer Summer Research Fellowship (University of Toledo, Toledo, OH)

Preprints/Publications

(All papers are peer reviewed (refereed). Orders of authors are alphabetical except for #4)

36 (with Nazlı Doğan) *Compactness of Hankel and Toeplitz operators on convex Reinhardt domains in* $\mathbb{C}^2$*,* submitted; arXiv: 2501.02339

35 (with Timothy G. Clos and Željko Čučković) *Compactness of composition operators on the Bergman space of the bidisc,* submitted; arXiv: 2409.09529

34 (with Željko Čučković and Zhenghui Huo) *On spectra of Hankel operators on the polydisc,* Canad. Math. Bull. **68** (2025), no. 1, 301–317 ; arXiv:2207.13116

33 (with Trieu Le and Tomas Miguel Rodriguez) *On compactness of products of Toeplitz operators,* Complex Anal. Oper. Theory **19** (2025), no. 1, Paper No. 2, 12 pp; arXiv: 2401.04869

32 (with Tomas Miguel Rodriguez) *Compactness of Toeplitz operators with continuous symbols on pseudoconvex domains in* $\mathbb{C}^n$*,* Proc. Amer. Math. Soc. Ser. B **11** (2024), 406–421; arXiv: 2302.05013

31 (with Nihat Gökhan Göğüş) *A sufficient condition for* L^p *regularity of the Berezin transform*, Var. Elliptic Equ. **68** (2023), no. 8, 1419–1428; arXiv:2108.07082

30 (with Mehmet Çelik and Emil J. Straube) *A sufficient condition for compactness of Hankel operators,* J. Operator Theory **89** (2023), no. 1, 75–85; arXiv:2011.02656

29 (with Željko Čučković and Zhenghui Huo) *Zero products of Toeplitz operators on Reinhardt domains,* Canad. Math. Bull. **65** (2022), no. 1, 170–179; arXiv:2009.01951

28 (with Yunus E. Zeytuncu) *On compactness and* L^p*-regularity in the* $\overline{\partial}$*-Neumann problem,* Bull. Lond. Math. Soc. **53** (2021), no. 5, 1357–1364; arXiv:2009.13391

27 (with Željko Čučković) *Berezin regularity of domains in* $\mathbb{C}^n$ *and the essential norms of Toeplitz operators,* Trans. Amer. Math. Soc. **374** (2021), no. 4, 2521–2540; arXiv:1909.09221

26 (with Nihat Gökhan Göğüş) *On convergence of the Berezin transforms,* J. Math. Anal. Appl. **491** (2020), no. 1, 124295, 16 pp.; arXiv:2001.09448

25 (with Mehmet Çelik and Emil J. Straube) *Compactness of Hankel operators with continuous symbols on convex domains,* Houston J. Math. **46** (2020), no. 4, 1005–1016; arXiv:2005.14323

24 (with Debraj Chakrabarti) *The restriction operator on Bergman spaces,* J. Geom. Anal. **30** (2020), 2157–2188; arXiv:1711.09438

23 (with Mehmet Çelik and Emil J. Straube) *Convex domains, Hankel operators, and maximal estimates,* Proc. Amer. Math. Soc. **148** (2020), no. 2, 751–764; arXiv:1902.10316

22 (with Akaki Tikaradze) *On a theorem of Bishop and commutants of Toeplitz operators in* $\mathbb{C}^n$*,* Rend. Circ. Mat. Palermo (2) **68** (2019), no. 2, 237–246; arXiv:1606.07780

21 (with Timothy G. Clos and Mehmet Çelik) *Compactness of Hankel operators with symbols continuous on the closure of pseudoconvex domains,* Integral Equations Operator Theory **90** (2018), no. 6, Art. 71, 14 pp; arXiv:1805.05829

20 (with Nihat Gökhan Göğüş) *Schatten class Hankel and* $\overline{\partial}$*-Neumann operators on pseudoconvex domains in* $\mathbb{C}^n$*,* Monatsh. Math. **187** (2018), no. 2, 237–245; arXiv:1706.04650

19 (with Željko Čučković) *Essential norm estimates for the* $\overline{\partial}$*-Neumann operator on convex domains and worm domains,* Indiana Univ. Math. J. **67** (2018), no. 1, 267–292; arXiv:1509.02606

18 (with Timothy G. Clos) *Compactness of Hankel operators with continuous symbols,* Complex Anal. Oper. Theory **12** (2018), no. 2, 365–376; arXiv:1608.08670

17 (with Željko Čučković and Yunus E. Zeytuncu) *A local weighted Axler-Zheng theorem in* $\mathbb{C}^n$*,* Pacific J. Math. **294** (2018), no. 1, 89–106; arXiv:1704.07042

16 (with Željko Čučković) *Essential norm estimates for Hankel operators on convex domains in* $\mathbb{C}^2$*,* Math. Scand. **120** (2017), 305–316; arXiv:1509.02394

15 (with Yunus E. Zeytuncu) *On compactness of Hankel and the* $\overline{\partial}$*-Neumann operators on Hartogs domains in* $\mathbb{C}^2$*,* J. Geom. Anal. **27** (2017), 1274–1285; arXiv:1510.07924

14 (with Željko Čučković) *Compactness of products of Hankel operators on convex Reinhardt domains in* $\mathbb{C}^2$*,* New York J. Math. **20** (2014), 627–643; arXiv:1201.4835

13 (with Mehmet Çelik) *Compactness of the* $\overline{\partial}$*-Neumann operator and of commutators of the Bergman projection with continuous functions,* J. Math. Anal. Appl. **409** (2014), no. 1, 393–398; arXiv:1211.5022

** (with Željko Čučković) *Erratum to: Axler-Zheng type theorem on a class of domains in* $\mathbb{C}^n$*, Integral Equations Operator Theory 77 (2013), no. 3, 397–405*, Integral Equations Operator Theory **79** (2014), no. 3, 449–450

12 (with Željko Čučković) *Axler-Zheng type theorem on a class of domains in* $\mathbb{C}^n$*,* Integral Equations Operator Theory **77** (2013), no. 3, 397–405; arXiv:1304.7199

11 *Localization of compactness of Hankel operators on pseudoconvex domains,* Illinois J. Math. **56** (2012), no. 3, 795–804; arXiv:1110.1823

10 (with Nihat Gökhan Göğüş) *Continuity of plurisubharmonic envelopes in* $\mathbb{C}^2$*,* Internat. J. Math. **23** (2012), no. 12, 1250124; arXiv:1107.5500

9 *Strong Stein neighborhood bases,* Complex Var. Elliptic Equ. **57** (2012), no.10, 1073–1085; arXiv:0705.0507

8 (with David Barrett) *Irregularity of the Bergman projection on worm domains in* $\mathbb{C}^n$*,* Michigan Math. J. **61** (2012), 187–198; arXiv:1007.5513

7 (with Mehmet Çelik) *On compactness of the* $\overline{\partial}$*-Neumann problem and Hankel operators,* Proc. Amer. Math. Soc. **140** (2012), no. 1, 153–159; arXiv:1008.4199

6 *A potential theoretic characterization of compactness of the* $\overline{\partial}$*-Neumann problem,* Geometric Analysis of Several Complex Variables and Related Topics, Contemporary Mathematics, vol. 550, Amer. Math. Soc., Providence, RI, 2011, pp. 155–160; arXiv:1011.6653

5 (with Željko Čučković) *Compactness of products of Hankel operators on the polydisk and some product domains in* $\mathbb{C}^2$*,* J. Math. Anal. Appl. **371** (2010), 341–346; arXiv:1004.0720

4 (with Divakar Viswanath) *Complex singularities and the Lorenz attractor,* SIAM Rev. **52** (2010), no.2, 294–314; arXiv:0901.4968

3 (with Željko Čučković) *Compactness of Hankel operators and analytic discs in the boundary of pseudoconvex domains,* J. Funct. Anal. **256** (2009), no.11, 3730–3742; arXiv:0809.1901

2 *A remark on irregularity of the* $\overline{\partial}$*-Neumann problem on non-smooth domains,* Proc. Amer. Math. Soc. **136** (2008), no. 7, 2529–2533; arXiv:math/0608501

1 (with Emil J. Straube) *Analytic discs, plurisubharmonic hulls, and non-compactness of the* $\overline{\partial}$*-Neumann operator,* Math. Ann. **334** (2006), no. 4, 809–820; arXiv:math/0412504

* *Compactness of the* $\overline{\partial}$*-Neumann Problem and Stein Neighborhood Bases,* Ph.D. thesis, Texas A&M University, TX, 2006

PhD Students

Jana Rachid

Trevor C. Pentzien

Tomas Miguel P. Rodriguez, graduated in May 2024

Timothy G. Clos, graduated in May 2017

Courses Taught

University of Toledo

Undergraduate Single Variable Calculus, Multivariable Calculus, Honors Calculus, Elementary Diferential Equations, Honors Differential Equations, Elementary Linear Algebra, Introduction to Mathematical Analysis, Complex Variables, Introduction to Real Analysis, Ordinary Differential Equations, Partial Differential Equations

Graduate Linear Algebra, Complex Analysis, Real Analysis, Ordinary Differential Equations, Partial Differential Equations

University of Michigan

Calculus III, Applied Honors Calculus IV, Introduction to Differential Equations

Texas A&M University

Business Mathematics

Courses Coordinated

University of Toledo

Calculus 1, Calculus 2, Multivariable Calculus

University of Michigan

Introduction to Differential Equations

Service

Conference Organizer

2025 May (with Siqi Fu, Samangi Munasinghe, Zhizhang Xie, and Yunus Zeytuncu) Midwest Several Complex Variables Conference in College Station, TX

2019 October (with David Barrett, Debraj Chakrabarti, and Yunus Zeytuncu) Midwest Several Complex Variables Conference in Dearborn, MI

2016 May (with Debraj Chakrabarti, Jeffery McNeal, and Yunus Zeytuncu) Midwest Several Complex Variables Conference in Toledo, OH

2013 January (with Željko Čučković) The special session titled “Several Complex Variables Techniques in Operator Theory" AMS-MAA Joint Mathematics Meetings in San Diego, CA

2012 October (with Mehmet Çelik and Alexander Izzo) The special session titled “Complex Analysis and its Broader Impacts" in the AMS 2012 Fall Central Section Meeting #1084 in Akron, OH

Seminar Organizer

2009 – 2015 Complex Analysis Seminar

Reviewer

Mathematical Reviews, Zentralblatt MATH

Journals Refereed

Acta Matematica Scientia, Acta Mathematica Sinica (English Series), Analysis Mathematica, Applications and Applied Mathematics, Bulletin of the London Mathematical Society, Complex Variables and Elliptic Equations, Far East Journal of Mathematical Sciences, Illinois Journal of Mathematics, Indiana Journal of Mathematics, Journal of Geometric Analysis, Journal of Mathematical Analysis and its Applications, Matematicki Vesnik, New York Journal of Mathematics

Thesis Committee Member

2021 May Anirban Dawn (PhD)

2020 July Uthpala Nawalage (PhD), Sunil Khanal (PhD)

2018 December Damith Thilakarthna (PhD)

2018 July Krisha Subedi (PhD), Rishi Subedi (PhD)

2017 April Douglas Oliver (MS)

2014 August Bhupendra Paudyal (PhD)

2013 August Amila Appuhamy (PhD)

2011 December Selin Bastas (MS)

Departmental Committees

Chair's Advisory Council, Computer Committee, Department Personnel Committee, Graduate Curriculum Committee, Graduate Student Affairs Committee, Research and Scholarly Affairs Committe, Teaching Evaluations Committee, Undergraduate Majors Committee, Undergraduate Majors Curriculum Committee

College Committees

NSM (College of Natural Sciences and Mathematics) Council, NSM Council Committee on Academic Grievance, NSM Retention Committee, College Strategic Planning Committee

University Committees

Graduate Council

Workshops

2018 December *Analysis and CR geometry*, (Erwin Schrödinger Institute, Vienna, Austria)

2016 August *Complex Geometry and the Cauchy-Riemann equation*, (Centre for Advanced Studies, Oslo, Norway)

2014 June *The Cauchy-Riemann equations in several variables*, (American Institute of Mathematics, Palo Alto, CA)

2013 June-July *Dirichlet to Neumann operators and the $\overline{\partial}$-problem*, Research in Pairs (Mathematisches Forschungsinstitut Oberwolfach, Germany)

2005 July-August *CR geometry: complex analysis meets real geometry and number theory*, (Mathematical Sciences Research Institute, Berkeley, CA)

Presentations

2023 November *Compactness of Toeplitz operators with symbols continuous on the closure*, Zu Chongzhi Mathematics Research Seminar (Duke Kunshan University, Kunshan, China)

2021 November *On irregularity of the Berezin transform*, Bilkent Analysis Seminar (Bilkent University, Ankara, Turkey)

2019 October *On regularity of the Berezin transform*, Topology, Analysis and Geometry Seminar (Central Michigan University, Mount Pleasant, MI)

2019 September *Hankel operators on forms and the $\overline{\partial}$-Neumann problem*, AMS 2019 Fall Central Sectional Meeting #1150 (University of Wisconsin, Madison, Wisconsin)

2019 May *Compactness and Schatten class Hankel operators*, Frontiers in Several Complex Variables and Functional Analysis (Middle East Technical University, Ankara, Turkey)

2018 October *On a theorem of Bishop and commutants of Toeplitz operators*, AMS 2018 Fall Central Sectional Meeting #1143 (University of Michigan, Ann Arbor, Michigan)

2018 June *Schatten class of the $\overline{\partial}$-Neumann operator*, CR-Geometry and PDE's – VIII (Trento, Italy)

2018 April *Schatten class Hankel and $\overline{\partial}$-Neumann operators*, the Analysis Day (University of Michigan at Dearborn, Dearborn, MI)

2018 April *Schatten class $\overline{\partial}$-Neumann operator*, Temple-Rutgers Global Analysis Seminar (Rutgers University – Camden, Camden, NJ)

2018 March *Schatten class Hankel and $\overline{\partial}$-Neumann operators*, AMS 2018 Spring Central Sectional Meeting #1136 (The Ohio State University, Columbus, OH)

2017 June *Pseudoconvex domains: where holomorphic functions live*, REU seminar (University of Michigan at Dearborn, Dearborn, MI)

2017 June *On D'Angelo's question*, Midwest Several Complex Variables Conference (Brown University, in Providence, RI)

2017 March *Pseudoconvex domains: where holomorphic functions live*, Mathematics Department General Seminar (Mimar Sinan Fine Arts University, Istanbul, Turkey)

2017 March *Essential norm estimates for Hankel operators on convex domains in $\mathbb{C}^2$*, Istanbul Analysis Seminar (Istanbul, Turkey)

2016 March *Pseudoconvex domains: where holomorphic functions live*, Colloquium (Texas A&M University - Commerse, Commerce, TX)

2016 March *Pseudoconvex domains: where holomorphic functions live*, Analysis Seminar (Bowling Green State University, Bowling Green, OH)

2016 January *Essential norm estimates for the $\overline{\partial}$-Neumann operator*, AMS-MAA 2016 Joint Mathematics Meeting (Seattle, WA)

2015 October *Estimating the failure of compactness of the $\overline{\partial}$-Neumann operator*, Harmonic Analysis, $\overline{\partial}$, and CR Geometry (Casa Matematica Oaxaca, Oaxaca, Mexico)

2015 May *Essential norm estimates for Hankel operators on convex domains in $\mathbb{C}^2$*, Several Complex Variables Seminar (Texas A&M University, College Station, TX)

2015 April *Essential norm estimates for Hankel operators on convex domains in $\mathbb{C}^2$*, Analysis and Applied Mathematics Seminar (Central Michigan University, Mount Pleasant, MI)

2015 March *Essential norm estimates for Hankel operators on convex domains in $\mathbb{C}^2$*, AMS 2012 Central Spring Section Meeting #1108 (Michigan State University, East Lansing, MI)

2015 January *Toeplitz and Hankel operators in several complex variables*, Analysis and Geometry in Several Complex Variables (Texas A&M University at Qatar, Doha, Qatar)

2014 March *On Axler-Zheng Theorem in $\mathbb{C}^n$*, 30th South Eastern Analysis Meeting (SEAM) (Clemson University, Clemson, SC)

2013 October *On Axler-Zheng Theorem in $\mathbb{C}^n$*, AMS 2013 Fall Eastern Sectional Meeting #1093 (Temple University, Philadelphia, PA)

2013 June *Operator theory from several complex variables perspective*, Function Theory and Complex Variables (Nesin Mathematics Village, Izmir, Turkey)

2013 April *Operator theory from several complex variables perspective*, Analysis Seminar (Georgia Institute of Technology, Atlanta, GA)

2013 March *Hankel operators on forms and the $\overline{\partial}$-Neumann problem*, 29th South Eastern Analysis Meeting (SEAM) (Virginia Virginia Polytechnic Institute and State University, Blacksburg, VA)

2012 November *Compactness of the $\overline{\partial}$-Neumann operator and of commutators of the Bergman projection with continuous functions*, Several Complex Variables Seminar (University of Michigan, Ann Arbor, MI)

2012 May *On compactness of products of Hankel operators*, Istanbul Analysis Seminars (Istanbul, Turkey)

2012 March *Localization of compactness of Hankel operators on pseudoconvex domains in* $\mathbb{C}^n$, AMS 2012 Spring Central Section Meeting #1081 (University of Kansas, Lawrence, KS)

2012 March *Localization of compactness of Hankel operators on pseudoconvex domains in* $\mathbb{C}^n$, 28th South Eastern Analysis Meeting (SEAM) (University of Alabama, Tuscaloosa, Al)

2011 August *Irregularity of the Bergman projection on worm domains in* $\mathbb{C}^n$, VI Workshop on Geometric Analysis of PDE and Several Complex Variables (Serra Negra, San Paulo, Brazil)

2011 March *Hankel operators and the* $\overline{\partial}$*-Neumann problem*, 27th South Eastern Analysis Meeting (SEAM) and John Conway Day (University of Florida, Gainesville, FL)

2010 October *Irregularity of the Bergman projection on worm domains in* $\mathbb{C}^n$, Tenth Prairie Analysis Seminar (University of Kansas, Lawrence, KS)

2010 October *Compactness of Hankel operators and boundary geometry*, Analysis Seminar (Bowling Green State University, Bowling Green, OH)

2010 May *Irregularity of the Bergman projection on worm domains in* $\mathbb{C}^n$, Geometric Analysis of Several Complex Variables and its Interactions (Marrakech, Morocco)

2009 November *Irregularity of the Bergman projection on worm domains in* $\mathbb{C}^n$, The $\overline{\partial}$-Neumann Problem: Analysis, Geometry, and Potential Theory (Erwin Schrödinger Institute, Vienna, Austria)

2009 August *Compactness of Hankel operators and boundary geometry*, V Workshop on Geometric Analysis of PDE and Several Complex Variables (Serra Negra, San Paulo, Brazil)

2008 September *Compactness of Hankel operators and analytic discs in the boundary of pseudoconvex domains*, Several Complex Variables Seminar (University of Michigan, Ann Arbor, MI)

2008 May *Compactness of Hankel operators and analytic discs in the boundary of pseudoconvex domains*, Istanbul Analysis Seminars (Istanbul, Turkey)

2008 March *Complex analysis is full of surprises in high dimensions*, Research Seminar (University of Michigan, Flint, MI)

2007 October *Boundary smoothness and irregularity of the* $\overline{\partial}$*-Neumann problem*, AMS 2007 Fall Central Section Meeting #1030 (DePaul University, Chicago, IL)

2007 September *A hull with no analytic structure (after Stolzenberg)*, RTG Working Seminar in SCV and Complex Dynamics (University of Michigan, Ann Arbor, MI)

2007 August *Boundary smoothness and irregularity of the* $\overline{\partial}$*-Neumann problem*, IV Workshop on Geometric Analysis of PDE and Several Complex Variables (Serra Negra, San Paulo, Brazil)

2007 March *On a sufficient condition for the existence of Stein neighborhood bases*, AMS 2007 Spring Central Section Meeting #1025 (Miami University, Oxford, OH)

2007 February *On the* $\overline{\partial}$*-problem and geometric properties of boundaries*, Colloquium Talk (University of Toledo, Toledo, OH)

2007 January *On Stein neighborhood bases*, Several Complex Variables Seminar (University of Michigan, Ann Arbor, MI)

2006 November *On a sufficient condition for the existence of Stein neighborhood bases*, Complex Analysis, Operator Theory, and Applications to Mathematical Physics; two follow up workshops to the 2005 program (Erwin Schrödinger Institute, Vienna, Austria)

2006 November *Compactness of the* $\overline{\partial}$*-Neumann problem and geometric properties of the boundary*, Several Complex Variables Seminar (University of Michigan, Ann Arbor, MI)

2006 November *Analytic discs and plurisubharmonic hulls*, AMS 2006 Fall Southeastern Section Meeting #1022 (University of Arkansas, Fayetteville, AR)

2005 October *Analytic discs, plurisubharmonic hulls, and non-compactness of the $\overline{\partial}$-Neumann operator*, Complex Analysis, Operator Theory, and Applications to Mathematical Physics (Erwin Schrödinger Institute, Vienna, Austria)

2004 December *Compactness of the $\overline{\partial}$-Neumann operator on domains with one degenerate eigenvalue*, Several Complex Variables Seminar (Texas A&M University, College Station, TX)