Martin Costabel

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Born: 2 October 1948, Münsingen, Germany

Education

1969–1973	**Diploma in mathematics**, *University Tübingen*
1977	**Thesis**, *Technical University Darmstadt* *"Kausale Distributionen und ihre Anwendung auf eine Klein-Gordon-Gleichung mit Potentialterm"*
1984	**Habilitation**, *Technical University Darmstadt* *"Starke Elliptizität von Randintegraloperatoren erster Art"*

Employment

1973–1975	**Doctoral grant**, *Studienstiftung des Deutschen Volkes*, Tübingen - Darmstadt
1976–1988	**Lecturer**, *"Wissenschaftlicher Mitarbeiter"* and *"Hoschschulassistent"*, Technical University Darmstadt
1988–1989	**Visiting Associate Professor**, Carnegie-Mellon University, Pittsburgh,USA
1989–1990	**Lecturer**, *"Wissenschaftlicher Mitarbeiter"*, Technical University Darmstadt
1990	**Visiting Professor**, University Heidelberg
1990–1991	**Visiting Associate Professor**, University Nantes and Paris VI
1991–1992	**Visiting Associate Professor**, University Bordeaux 1
1992–2016	**Professor**, University Rennes 1 1992: 2e classe, 1993: 1e classe, 2010: classe exceptionnelle
2016–	**Emeritus Professor**, University of Rennes 1. Since 01/01/2023: University of Rennes

Research interests

Subjects	Partial differential equations, Integral equations, Harmonic Analysis, Numerical analysis
Applications	Electromagnetism, Elasticity, Quantum mechanics
Topics	○ Elliptic boundary value problems in domains with corners ○ Elliptic boundary value problems and harmonic analysis in Lipschitz domains ○ Boundary and volume integral equations for Maxwell equations ○ Boundary elements and finite elements for Maxwell equations ○ Singular perturbations

Scientific activities

Authorship	Author or co-author of more than 120 documents (books, articles in peer-reviewed journals or collections). Below, publications from the last 12 years.
Bibliometry	ZbMath: 122 publications, 3190 citations. Scopus h-index 34
PhD supervision	Advisor or co-advisor of 9 PhD students (between 1995 and present). 8 of them have defended their dissertation with success.
Research fellowships	ANU Canberra 2000 and 2003 and 2005, ICES Austin 2002 and 2008 and 2011, Newton Institute Cambridge 2003, TU Graz 2007, IST Lisbon 2007, U Athens 2011, U Padova 2015 and 2018, U Wien 2019
Invited plenary talks	Aveiro 2005, Graz 2006, Concepción 2007, Saarbrücken 2008, Levico Terme 2009, Chemnitz 2009, Hannover 2009, Pavia 2010, Shanghai 2010, Lisbon 2011, Aveiro 2011, Vancouver 2011, Metz 2012, Banff 2012, Jaca 2012, Uxbridge 2013, Karlsruhe 2014, Salt Lake City 2014, Padua 2015, Strobl 2016, Linz 2016, Paris 2017, Pau 2017, Paris 2018, Roscoff 2018, Padua 2018, Galați 2019, Valenciennes 2021, Matera 2024
Distinction	IABEM 2014 Frank J. Rizzo Award "For Outstanding Contributions to Research on Boundary Element Methods"

Recent publications

[1] M. Costabel, "Some historical remarks on the positivity of boundary integral operators," in *Boundary element analysis*, vol. 29 of *Lect. Notes Appl. Comput. Mech.*, pp. 1–27, Berlin: Springer, 2007.

[2] M. Costabel, E. Darrigrand, and E. H. Koné, "Volume and surface integral equations for electromagnetic scattering by a dielectric body," *J. Comput. Appl. Math.*, vol. 234, no. 6, pp. 1817–1825, 2010.

[3] M. Costabel, M. Dauge, and L. Demkowicz, "Polynomial extension operators for H^1, $H(\mathrm{curl})$ and $H(\mathrm{div})$-spaces on a cube," *Math. Comp.*, vol. 77, no. 264, pp. 1967–1999, 2008.

[4] M. Costabel and A. McIntosh, "On Bogovskiĭ and regularized Poincaré integral operators for de Rham complexes on Lipschitz domains," *Math. Z.*, vol. 265, no. 2, pp. 297–320, 2010.

[5] M. Costabel, M. Dauge, and S. Nicaise, "Mellin analysis of weighted Sobolev spaces with nonhomogeneous norms on cones," in *Around the research of Vladimir Maz'ya. I*, vol. 11 of *Int. Math. Ser. (N. Y.)*, pp. 105–136, Springer, New York, 2010.

[6] D. Boffi, M. Costabel, M. Dauge, L. Demkowicz, and R. Hiptmair, "Discrete compactness for the p-version of discrete differential forms," *SIAM J. Numer. Anal.*, vol. 49, no. 1, pp. 135–158, 2011.

[7] M. Costabel and F. Le Louër, "On the Kleinman-Martin integral equation method for electromagnetic scattering by a dielectric body," *SIAM J. Appl. Math.*, vol. 71, no. 2, pp. 635–656, 2011.

[8] M. Costabel, M. Dauge, and S. Nicaise, "Analytic regularity for linear elliptic systems in polygons and polyhedra," *Math. Models Methods Appl. Sci.*, vol. 22, no. 8, pp. 1250015, 63, 2012.

[9] M. Costabel, A. McIntosh, and R. J. Taggart, "Potential maps, Hardy spaces, and tent spaces on special Lipschitz domains," *Publ. Mat.*, vol. 57, no. 2, pp. 295–331, 2013.

[10] Z. Yosibash, S. Shannon, M. Dauge, and M. Costabel, "Circular edge singularities for the Laplace equation and the elasticity system in 3-D domains," *International Journal of Fracture*, vol. 168, pp. 31–52, Mar 2011.

[11] M. Costabel, E. Darrigrand, and H. Sakly, "The essential spectrum of the volume integral operator in electromagnetic scattering by a homogeneous body," *C. R. Math. Acad. Sci. Paris*, vol. 350, no. 3-4, pp. 193–197, 2012.

[12] M. Costabel and F. Le Louër, "Shape derivatives of boundary integral operators in electromagnetic scattering. Part I: Shape differentiability of pseudo-homogeneous boundary integral operators," *Integral Equations Operator Theory*, vol. 72, no. 4, pp. 509–535, 2012.

[13] M. Costabel and F. Le Louër, "Shape derivatives of boundary integral operators in electromagnetic scattering. Part II: Application to scattering by a homogeneous dielectric obstacle," *Integral Equations Operator Theory*, vol. 73, no. 1, pp. 17–48, 2012.

[14] M. Costabel, M. Dauge, and S. Nicaise, "Weighted analytic regularity in polyhedra," *Comput. Math. Appl.*, vol. 67, no. 4, pp. 807–817, 2014.

[15] S. Shannon, Z. Yosibash, M. Dauge, and M. Costabel, "Primal and Shadow functions, Dual and Dual-Shadow functions for a circular crack and a circular 90° V-notch with Neumann boundary conditions," tech. rep., Jan. 2013.

[16] M. Dauge, C. Bernardi, M. Costabel, and V. Girault, "On Friedrichs constant and Horgan-Payne angle for LBB condition," in *Twelfth International Conference Zaragoza-Pau on Mathematics*, vol. 39 of *Monogr. Mat. García Galdeano*, pp. 87–100, Prensas Univ. Zaragoza, Zaragoza, 2014.

[17] M. Costabel and M. Dauge, "On the inequalities of Babuška-Aziz, Friedrichs and Horgan-Payne," *Arch. Ration. Mech. Anal.*, vol. 217, no. 3, pp. 873–898, 2015.

[18] M. Costabel, M. Crouzeix, M. Dauge, and Y. Lafranche, "The inf-sup constant for the divergence on corner domains," *Numer. Methods Partial Differential Equations*, vol. 31, no. 2, pp. 439–458, 2015.

[19] M. Costabel, "On the spectrum of volume integral operators in acoustic scattering," in *Integral methods in science and engineering*, pp. 119–127, Birkhäuser/Springer, Cham, 2015.

[20] M. Costabel, E. Darrigrand, and H. Sakly, "Volume integral equations for electromagnetic scattering in two dimensions," *Comput. Math. Appl.*, vol. 70, no. 8, pp. 2087–2101, 2015.

[21] M. Costabel, "Inequalities of Babuška-Aziz and Friedrichs-Velte for differential forms," in *Recent trends in operator theory and partial differential equations*, vol. 258 of *Oper. Theory Adv. Appl.*, pp. 79–88, Birkhäuser/Springer, Cham, 2017.

[22] C. Bernardi, M. Costabel, M. Dauge, and V. Girault, "Continuity properties of the inf-sup constant for the divergence," *SIAM J. Math. Anal.*, vol. 48, no. 2, pp. 1250–1271, 2016.

[23] M. Costabel, M. Dalla Riva, M. Dauge, and P. Musolino, "Converging expansions for Lipschitz self-similar perforations of a plane sector," *Integral Equations Operator Theory*, vol. 88, no. 3, pp. 401–449, 2017.

[24] M. Costabel, "On the limit Sobolev regularity for Dirichlet and Neumann problems on Lipschitz domains," *Mathematical News / Mathematische Nachrichten*, vol. 292, pp. 2165–2173, 2019.

[25] M. Costabel and F.-J. Sayas, "Time-dependent problems with the boundary integral equation method," in *Encyclopedia of Computational Mechanics Second Edition* (E. Stein, R. Borst, and T. J. Hughes, eds.), pp. 1–24, John Wiley & Sons, 2017.

[26] M. Costabel and M. Dauge, "Maxwell eigenmodes in product domains," in *Maxwell's Equations, Analysis and Numerics* (U. Langer, D. Pauly, and S. I. Repin, eds.), Radon Series on Computational and Applied Mathematics, De Gruyter, May 2019.

[27] M. Costabel, M. Dauge, and J.-Q. Hu, "Characterization of Sobolev spaces by their Fourier coefficients in axisymmetric domains," *Calcolo*, vol. 60, no. 1, p. article n°15, 2023.

[28] M. Costabel, "Convergence of a simple discretization of the finite Hilbert transformation," *Comput. Math. Appl.*, vol. 150, pp. 15–21, 2023.

[29] M. Costabel, M. Dauge, and K. Nedaiasl, "Stability analysis of a simple discretization method for a class of strongly singular integral equations," *Integral Equations Oper. Theory*, vol. 95, no. 4, p. 36, 2023. Id/No 29.

[30] M. Costabel, M. D. Riva, M. Dauge, and P. Musolino, "Dirichlet problem on perturbed conical domains via converging generalized power series." Preprint, arXiv:2408.02387 [math.AP] (2024), 2024.