1 Curriculum vitae

1959 – 1971	Schools in Eisfeld and Hildburghausen, Germany
1971 – 1975	Student of Mathematics at Chemnitz University of Technology
1975	Diploma in Mathematics
1975 – 1981	Scientific assistent at Chemnitz University of Technology
1981 –	Dr. rer. nat. (= PhD), advisors: B. Silbermann, G. Heinig
1981 – 2008	Faculty member under the professorship of B. Silbermann, or later D. Potts at the Department of Mathematics, Chemnitz University of Technology
2008 –	Prof. apl. at Chemnitz University of Technology

married, two children (born 1972 and 1978), four grandchildren

1997 – 2000	Member of the Senate of Chemnitz University of Technology
1991 – 1996	Member of the Council of Chemnitz University of Technology
2003 – 2012	and of the Council of the Department of Mathematics
1997 – 2019	Member of the committee of the state of Saxony for the promotion of high-school students interested and talented in mathematics and natural sciences
2009 – 2018	Member of the Extended Senate of Chemnitz University of Technology

2 Personal statement on the organic relationship of teaching and research

Working at a university means for me to combine academia and research. Neglecting the research component bears the risk that the teaching loses its connection to the forefront of science, that the academic level declines and those aspects which would attract brilliant minds become abandoned. The efforts to achieve high teaching standards give rise to improvements in presenting scientific results with respect to methodology, logics, and comprehensibility as well. That, again, facilitates a pleasant and more efficient cooperation with other colleagues, be them coauthors in publications, be them partners in discussions, or, presumably of most importance, junior scientists. Eventually, this provides for both increased motivation as well as satisfaction.
Consequently, during the many years of my appointment to the Faculty of Mathematics, I have never stopped working on mathematical problems, presenting the obtained results on national as well as international conferences and publishing them in renowned journals. Within that respect, I have taken benefit from the didactical, methodological and social experiences I gathered throughout my comprehensive teaching work. On the other hand, I have been able to raise curiosity, excitement and perseverance with a great number of my students due to involving current mathematical investigations and results.
This mutual fertilization is it what has preserved the pleasure I keep finding in my work as well as the conviction, the confidence of its value.

- Fields of research: Numerical and applied linear algebra, in particular,
  - Algebraic theory of structured matrices,
  - Construction of efficient algorithms for structured linear systems of equations
- Present activities:
  - Design of more efficient algorithms for structured matrices with additional symmetries
  - Matrix representations of Cauchy-like matrices

  - Fast algorithms for Toeplitz-plus-Hankel matrices which are not stongly nonsingular
  - Algebraic properties of Toeplitz-plus-Hankel Bezoutians
  - Inversion of Bezoutians

- Fields of teaching:
  - Linear Algebra and Geometry I-II,
  - Algebra for Physicists,
  - Analysis I-III,
  - Analysis for Physicists,
  - Ordinary Differential Equations,
  - Functional Analysis,
  - Mathematics for students of Electrical Engineering,
  - Mathematics for Computer Science students,
  - Theory of Complex Functions,
  - Algebra (Groups, Fields, Rings),
  - Structured Matrices,
  - Fast Algorithms for Structured Systems,
  - Applied Linear Algebra, and others

  For example:

· 2006-2007	Algebra I and II for physicists
· 2005, 2006, 2009, 2012, 2015	Applied Linear Algebra
· 2005-2006	Algebra (Groups, Fields, Rings)
· 2002, 2004, 2006, 2008, 2009, 2010, 2016-2017	Ordinary Differential Equations
· 1999-2000	Structured Matrices (in English)
· 2002-2008	Analysis I – IV for physicists
· 2008	Fast solution of structured linear systems
· 2007-2008, 2010-2013, 2014-2015, 2016-2017	Analysis for mathematicians
· 2008-2010, 2011-2012, 2013-2014, 2015-2016, 2017-2018	Linear Algebra for mathematicians
· 2008-2010	Mathematics for physicists and Computational Science students
· 2000-2008	Mathematics for Computer Science students
· 2016-2017	Vector analysis

3 Invited talks (since 1996)

Juni 2019	Women in Operator Theory and its Applications (WOT 2019) Tecnico Lisbon (Portugal)
Sept. 2018	Mecklenburg Workshop on Approximation Methods and Fast Algorithms (Hasenwinkel)
Sept. 2017	5th Najman Conference on Spectral Theory and Differential Equations Opatija (Croatia)
Aug. 2017	International Workshop on Operator Theory and its Applications (IWOTA 2017), Organisation of a Minisymposium on Structured Matrices and Operators, TU Chemnitz (Germany)
Sept. 2016	4th Dolomites Workshop on Constructive Approximation and Appl. (DWCAA 2016), Canazei (Italy)
Sept. 2014	Conference on Structured Numerical Linear and Multilinear Algebra (SLA 2014), Kalamata (Greece)
July 2014	International Workshop on Operator Theory and its Applications (IWOTA 2014), Vrije Universiteit Amsterdam (Holland)
Sept. 2013	MatTriad'2013 - Conference on Matrix Aanalysis and its Applications, Herceg-Novi (Montenegro)
Juni 2013	Mecklenburger Workshop, Hasenwinkel
Sept. 2012	Structured Multilinear Algebra (SLA) Conference, KU Leuven (Belgium)
July 2011	International Workshop on Operator Theory and its Applications (IWOTA 2011), University of Sevilla (Spanien)
Sept. 2010	NAAT Conference in Cluj-Napoca (Romania)
May 2010	GAMM-ANLA Workshop, Novi Sad (Serbia)
Nov. 2009	Kolloquium Angewandte Mathematik, Universität Hamburg
Oct. 2009	Minisymposium: Analytical and Numerical Treatment of Structured Problems, Workshop on Advances and Trends in Integral Equations, TU Chemnitz and WIAS, Klaffenbach (Germany)
Sept. 2009	International Conference on Functional Analysis and Approximation (FAAT), Maratea (Italy)
Sept. 2008	Lecturer at the "Summer School on Applied Analysis" at the University of Technology in Chemnitz (Germany)
July 2008	International Workshop on Operator Theory and its Applications (IWOTA 2008), College of William and Mary, Williamsburg (USA)
June 2008	Workshop "Approximation Methods and Fast Algorithms" (celebration of the 65th birthday of Manfred Tasche), Hasenwinkel / Mecklenburg (Germany)
Aug. 2006	International Workshop on Operator Theory and its Applications (IWOTA 2006), Seoul National University, Seoul (Korea)
June 2007	International Conference on Spectral and High Order Methods (ICOSAHOM 2007), Peking (China)
March 2007	8 lectures for graduate and PhD students, Università di Basilicata, Potenza (Italy)

July 2004	International Workshop on Operator Theory and its Applications (IWOTA 2004), University of Newcastle, Newcastle upon Tyne (England)
March 2004	75. Jahrestagung der GAMM, TU Dresden
July 2003	Workshop "Approximation Methods and Fast Algorithms" (celebration of the 60th birthday of Manfred Tasche), Hasenwinkel / Mecklenburg
June 2003	International Workshop on Operator Theory and its Applications (IWOTA 2003), Università di Cagliari, Sardinia (Italy)
May 2003	ETNA's 10th birthday conference "ETNA: Following the Flows of Numerical Analysis", Kent State University, Kent. Ohio (USA)
Sept. 2002	GAMM workshop "Numerical Linear Algebra with special emphasis on Multilevel and Krylov Subspace Methods", Universität Bielefeld
Aug. 2002	International Workshop on Operator Theory and its Applications (IWOTA 2002), Virginia Tech, Blacksburg, Virginia (USA)
May 2002	International Conference "Structured Matrices", The Chinese University of Hong Kong and The University of Hong Kong, Hong Kong (China)
Oct. 2001	International Conference "Numerical Algorithms in Honor of Claude Brezinski", Marrakesh (Morocco)
Sept. 2001	GAMM workshop "Numerical Methods for Structured and Random Matrices", TU Berlin
Sept. 2001	Università di Pisa (Italy)
Aug. 2001	AMS-IMS-SIAM Summer Research Conference "Fast Algorithms in Mathematics, Computer Science and Engineering", Mount Holyoke College, South Hadley, Massachusetts (USA)
Sept. 2000	Workshop "Structured Matrices: Analysis, Algorithms, and Applications", Cortona (Italy)
Sept. 2000	International Workshop on Operator Theory and its Applications (IWOTA Portugal 2000), Universidade do Algarve, Faro (Portugal)
Jan. 2000	Workshop on Structured Matrices, Conference Organization (together with Volker Mehrmann), TU Chemnitz
June 1999	AMS-IMS-SIAM Joint Summer Research Conference "Structured Matrices in Operator Theory, Numerical Analysis, Control, Signal and Image Processing", University of Colorado, Boulder, Colorado (USA)
June 1999	Workshop "Large-Scale Scientific Computations", Sozopol (Bulgaria)
Jan. 1999	Workshop on Applied Linear Algebra, Celebration of the 60th birthday of L. Elsner, Universität Bielefeld
May 1998	International Conference "Fourier Analysis and Applications", Kuwait University (Kuwait)
March 1997	8. Mecklenburger Frühjahrsschule, Graal-Müritz
Nov. 1996	Final Meeting of the EU-Project ROLLS, Universität Leipzig
Sept. 1996	3 lectures at the Summer School of Computational Mathematics, Vico Equense (Italy)
Aug. 1996	6th Conference of the International Linear Algebra Society, TU Chemnitz
July 1996	Prague Mathematical Conference, Charles University Prague (CZ)

4 List of publications

Book

G. Heinig and K. Rost, *Algebraic methods for Toeplitz-like matrices and operators*, Birkhäuser Verlag, Basel, Boston, Stuttgart 1984.
Akademie Verlag, Berlin, 1984.

Papers

1. T. Ehrhardt and K. Rost, A direct proof of an inversion formula for Bezoutians, Operator Theory: Advances and Appl. **297** (2024), 69-81.
2. T. Ehrhardt and K.Rost, Inversion formulas for Toeplitz-plus-Hankel matrices, Linear Algebra Appl. **697** (2024), 420-442.
3. T. Ehrhardt and K. Rost, On Toeplitz-plus-Hankel matrices and Toeplitz-plus-Hankel-Bezoutians, Operators and Matrices, **16**, 3 (2022), 859-894.
4. T. Ehrhardt and K. Rost, Restricted inversion of split Bezoutians, Operator Theory: Advances and Appl., **268** (2018), 207-246.
5. T. Ehrhardt and K. Rost, Fast inversion of centrosymmetric Toeplitz-plus-Hankel Bezoutians, Operator Theory: Advances and Appl., **259** (2017), 267-300.
6. T. Ehrhardt and K. Rost, Inversion of centroskewsymmetric Toeplitz-plus-Hankel Bezoutians, Electronic Journal of Linear Algebra, **30** (2015), 336-359.
7. T. Ehrhardt and K. Rost, Inversion of centrosymmetric Toeplitz-plus-Hankel Bezoutians, Electronic Transactions on Numerical Analysis, **42** (2014), 106-135.
8. T. Ehrhardt and K. Rost, Resultant matrices and inversion of Bezoutians, Linear Algebra Appl., **439** (2013), 621-639.
9. T. Ehrhardt and K. Rost, On the kernel structure of generalized resultant matrices, Indagationes Mathematicae **23** (2012), 1053-1069 .
10. K. Rost, Matrix representations of Split Bezoutians, Linear Algebra Appl., **436** (2012), 3904-3918.
11. G. Heinig and K. Rost, Fast algorithm for Toeplitz and Hankel matrices, Linear Algebra Appl., **435** (2011), 1-59.
12. G. Heinig and K. Rost, Introduction to Bezoutians, Operator Theory: Advances and Appl., **199** (2010), 25-118.
13. K. Rost, G. Heinig: A personal memoir and application, Operator Theory: Advances and Appl., **199** (2010), 7-24.
14. K. Rost, Toeplitz-plus-Hankel Bezoutians and Inverses of Toeplitz and Toeplitz-plus-Hankel matrices, Operators and Matrices **2** (2008), 385-406.
15. P. Junghanns and K. Rost, Matrix representations associated with collocation methods for Cauchy singular integral equations, Math. Meth. Appl. Sci., **30** (2007), 1811–1821.
16. G. Heinig and K. Rost, Split algorithms for centrosymmetric Toeplitz-plus- Hankel matrices with arbitrary rank profile, Operator Theory: Advances and Appl., **171** (2007), 129-146.

17. K. Rost, Georg Heinig: November 24, 1947–May 10, 2005, A personal memoir and appreciation, Linear Algebra Appl., **413** (2006), 1-12.

18. G. Heinig and K. Rost, Schur-type algorithms for the solution of Hermitian Toeplitz systems via factorization, Operator Theory: Advances and Appl., **160** (2005), 233-252.

19. G. Heinig and K. Rost, Fast "split" algorithms for Toeplitz and Toeplitz-plus- Hankel matrices with arbitrary rank profile, Proceedings of the International Conference on Mathematics and its Applications (ICMA 2004), 285-312, Kuwait Univ. Dep. Math. Comput. Sci., Kuwait, 2005.

20. G. Heinig and K. Rost, Split algorithms for symmetric Toeplitz matrices with arbitrary rank profile, Numer. Linear Algebra Appl., **12**, 2-3 (2005), 141-151.

21. P. Junghanns and K.Rost, Krylov subspace methods for Cauchy singular integral equations, Facta Universitatis, Ser. Math. Inform. **19** (2004), 93-108.

22. A. Böttcher and K. Rost, Topics in the numerical linear algebra of Toeplitz and Hankel matrices, GAMM Mitteilungen: Applied and Numerical Linear Algebra, **27**, 2 (2004), 174-188.

23. U. Luther and K. Rost, Matrix exponentials and inversion of confluent Vandermonde matrices, ETNA **18** (2004), 91–100.

24. G. Heinig and K. Rost, Split Algorithms for Hermitian Toeplitz matrices with arbitrary rank profile, Linear Algebra Appl., **392** (2004), 235–253.

25. G. Heinig and K. Rost, Split algorithms for skewsymmetric Toeplitz matrices with arbitrary rank profile, Theoretical Computer Science, **315**, 2–3, (2004), 453–468.

26. G. Heinig and K. Rost, New fast algorithms for Toeplitz-plus-Hankel matrices, SIAM Journal Matrix Anal. Appl., **25**, 3, (2003), 842–857.

27. G. Heinig and K. Rost, Fast algorithms for centro-symmetric and centro-skewsymmetric Toeplitz-plus-Hankel matrices, Numerical Algorithms, **33**, (2003), 305–317.

28. G. Heinig and K. Rost, Centro-symmetric and centro-skewsymmetric Toeplitz-plus-Hankel matrices and Bezoutians, Linear Algebra Appl., **366**, (2003), 257–281.

29. G. Heinig and K. Rost, Fast algorithms for skewsymmetric Toeplitz matrices, Operator Theory: Advances and Applications, **135**, (2002), 193–208.

30. P. Junghanns, K. Müller and K. Rost, On collocation methods for nonlinear Cauchy singular integral equations, Operator Theory: Advances and Applications, **135**, (2002), 209–233.

31. G. Heinig and K. Rost, Split algorithm and ZW-factorization for Toeplitz and Toeplitz-plus-Hankel matrices, Proceedings of the MTNS, Notre Dame 2002.

32. M. K. Ng, K. Rost and Y.-W. Wen, On inversion of Toeplitz matrices, Linear Algebra Appl. **348** (2002), 145–151.

33. G. Heinig and K. Rost, Centro-symmetric and centro-skewsymmetric Toeplitz matrices and Bezoutians, Special issue on structured and infinite systems of linear equations, Linear Algebra Appl. **343/344** (2002), 195–209.

34. G. Heinig and K. Rost, Efficient inversion formulas for Toeplitz-plus-Hankel matrices using trigonometric transformations, in *Structured matrices in mathematics, computer science, and engineering, II (Boulder, CO, 1999)*, 247–264, Contemp. Math., 281, Amer. Math. Soc., Providence, RI, 2001.

35. G. Heinig and K. Rost, Representations of Cauchy matrices with Chebyshev nodes, Advances in Computation: Theory and Practice, **4**, Nova Science Publ., Inc., Huntington, New York (2001), 135–147.

36. G. Heinig and K. Rost, Hartley transform representations of symmetric Toeplitz matrix inverses with application to fast matrix-vector multiplication, SIAM J. Matrix Anal. Appl. **22** (2000), no. 1, 86–105.

37. G. Heinig and K. Rost, Hartley transform representations of inverses of real Toeplitz-plus-Hankel matrices, Proceedings of the International Conference on Fourier Analysis and Applications (Kuwait, 1998), Numer. Funct. Anal. Optim. **21** (2000), no. 1-2, 175–189.

38. K. Rost and Z. Vavřín, Rational interpolation and recursive solution of Löwner-Vandermonde systems of equations, J. Comput. Appl. Math. 114 (2000), no. 2, 319–331J. Comput. Appl. Math. **114** (2000), no. 2, 319–331.

39. G. Heinig and K. Rost, Representations of inverses of real Toeplitz-plus-Hankel matrices using trigonometric transformations, in *Large-scale scientific computations of engineering and environmental problems, II (Sozopol, 1999)*, 80–86, Vieweg, Braunschweig, 2000.

40. G. Heinig and K. Rost, DFT representations of Toeplitz-plus-Hankel Bezoutians with application to fast matrix-vector multiplication, ILAS Symposium on Fast Algorithms for Control, Signals and Image Processing (Winnipeg, MB, 1997), Linear Algebra Appl. **284** (1998), no. 1-3, 157–175.

41. K. Rost and Z. Vavřín, Inversion formulas and fast algorithms for Löwner-Vandermonde matrices, Proceedings of the Sixth Conference of the International Linear Algebra Society (Chemnitz, 1996), Linear Algebra Appl. **275/276** (1998), 537–549.

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44. K. Rost and Z. Vavřín, Recursive solution of Löwner-Vandermonde systems of equations, I, Linear Algebra Appl. **233** (1996), 51–65.

45. G. Heinig and K. Rost, Recursive solution of Cauchy-Vandermonde systems of equations, Linear Algebra Appl. **218** (1995), 59–72.

46. K. Rost, Generalized Lyapunov equations, matrices with displacement structure, and generalized Bezoutians, Linear Algebra Appl. **193** (1993), 75–93.

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48. T. Finck, G. Heinig and K. Rost, An inversion formula and fast algorithms for Cauchy-Vandermonde matrices, Linear Algebra Appl. **183** (1993), 179–191.

49. K. Rost, Möbius transformations, matrix representations for generalized Bezoutians, and fast algorithms for displacement structured systems of equations, Wiss. Z. Tech. Univ. Chemnitz **33** (1991), no. 1, 29–36.

50. T. Finck and K. Rost, Fast inversion of Cauchy-Vandermonde matrices, in *Seminar Analysis (Berlin, 1989/1990)*, 69–79, Karl-Weierstrass-Inst. Math., Berlin, 1990.

51. G. Heinig and K. Rost, Matrices with displacement structure, generalized Bezoutians, and Moebius transformations, in *The Gohberg anniversary collection, Vol. I (Calgary, AB, 1988)*, 203–230, Birkhäuser, Basel, 1989.

52. G. Heinig and K. Rost, Inversion of matrices with displacement structure, Integral Equations Operator Theory **12** (1989), no. 6, 813–834.

53. G. Heinig, W. Hoppe and K. Rost, Structured matrices in interpolation and approximation problems, Wiss. Z. Tech. Univ. Karl-Marx-Stadt **31** (1989), no. 2, 196–202.

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55. G. Heinig and K. Rost, Matrix representations of Toeplitz-plus-Hankel matrix inverses, Linear Algebra Appl. **113** (1989), 65–78.

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59. G. Heinig and K. Rost, Fast inversion of Toeplitz-plus-Hankel matrices, Wiss. Z. Tech. Hochsch. Karl-Marx-Stadt **27** (1985), no. 1, 66–71.

60. G. Heinig and K. Rost, Invertierung von Toeplitzmatrizen und ihren Verallgemeinerungen, I. Die Methode der UV-Reduktion, Beiträge Numer. Math., **12**, (1984), 55–73.

61. G. Heinig and K. Rost, Schnelle Invertierungsalgorithmen für einige Klassen von Matrizen, Wiss. Z. Tech. Hochsch. Karl-Marx-Stadt **26** (1984), no. 2, 235–241.

62. G. Heinig and K. Rost, *Invertierung einiger Klassen von Matrizen und Operatoren. I. Endliche Toeplitzmatrizen und ihre Verallgemeinerungen*, Tech. Hochschule Karl-Marx-Stadt, Wiss. Inform. **12**, 1979.

63. B. Silbermann and K. Rost, Das Reduktionsverfahren für eine Klasse ausgearteter Integrodifferenzengleichungen, Wiss. Z. Tech. Hochsch. Karl-Marx-Stadt **20** (1978), no. 6, 689–691.

64. G. Heinig and K. Rost, Über homogene Gleichungen vom Faltungstyp auf einem endlichen Intervall, Demonstratio Math. **10** (1977), no. 3-4, 791–806.