Carl Christian Kjelgaard Mikkelsen

Computational scientist

Umeå University
90187 Umeå
Sweden
✉ *spock@cs.umu.se*
https://people.cs.umu.se/spock/

"Big concerns grow from small concerns. You plant them, water them with tears, fertilize them with unconcern. If you ignore them, they grow" — Ambassor Londo Mollari, Babylon 5

Education

2004–2009 **PhD**, *Purdue University*, West Lafayette, Indiana, USA.
Mathematics with a specialization in computational science and engineering

2003 **MSc**, *Aarhus University*, Aarhus, Denmark.
Mathematics with an emphasis on analysis and differential equations

PhD thesis

title *Numerical methods for large Lyapunov equations*

supervisor Ahmed Sameh

Master thesis

title *The finite difference method as an analytical tool*

supervisor Ole Østerby

Experience

2011–present **Researcher**, *Umeå University*, Umeå, Sweden.
Parallel numerical linear algebra

2009–2011 **Post-doctoral researcher**, *Umeå University*, Umeå, Sweden.
Parallel numerical linear algebra

2010–present **Lecturer**, *Umeå University*, Umeå, Sweden.
5DV005: Introduction to scientific computing

2009 **Graduate lecturer**, *Purdue University*, West Lafayette, USA.
CS 314: Numerical Methods

Nominations

2017 **UmU Faculty of Science's award for pedagocial excellence**.

2016 **NTK's award for pedagocial excellence**.
NTK is the student union at the Faculty of Science at Umeå University

2015 **NTK's award for pedagocial excellence**.

2011 **BIT's Carl-Erik Fröberg Prize for young authors**.
An award offered by BIT Numerical Mathematics

Awards

2013 **Best poster presentation**.
Parallel Processing and Applied Mathematics, joint work with Lars Karlsson

Languages

Danish	Fluent	*Native language speaker*
English	Fluent	*Native language speaker*
Swedish	Conversational	
German	Beginner	

Computer skills

C	OpenMP, MPI, StarPU	LaTeX	20+ years of use
Fortran	OpenMP, MPI	Matlab	15+ years of use

Book chapter

[1] Mikkelsen, C. C. K. The Explicit Spike Algorithm: Iterative Solution of the Reduced System. In *High-Performance Scientific Computing: Algorithms and Applications*, M. W. Berry, K. A. Gallivan, E. Gallopoulos, A. Grama, B. Philippe, Y. Saad, and F. Saied, Eds. Springer, 2012, ch. 6, pp. 147–156.

Peer-reviewed journal papers

[1] Mikkelsen, C. C. K., Schwarz, A. B., and Karlsson, L. Parallel robust solution of triangular linear systems. *Concurrency and Computation: Practice and Experience 31*, 19 (2019), 1–19.

[2] Mikkelsen, C. C. K. Retracing the residual curve of a Lyapunov equation solver. *BIT Numerical Mathematics 51*, 4 (2011), 959–975.

[3] Mikkelsen, C. C. K., and Manguoglu, M. Analysis of the truncated Spike algorithm. *SIAM Journal on Matrix Analysis and Applications 30*, 4 (2008), 1500–1519.

Peer-reviewed conference proceedings

[1] Mikkelsen, C. C. K., and Myllykoski, M. Parallel Robust Computation of Generalized Eigenvectors of Matrix Pencils. In *Parallel Processing and Applied Mathematics* (2020). To appear in the Proceedings of PPAM-2019, Bialystok, Poland, September 2019.

[2] Myllykoski, M., and Mikkelsen, C. C. K. Introduction to StarNEig – A Task-based Library for Solving Nonsymmetric Eigenvalue Problems. In *Parallel*

Processing and Applied Mathematics (2020). To appear in the Proceedings of PPAM-2019, Bialystok, Poland, September 2019.

[3] Schwarz, A. B., and Mikkelsen, C. C. K. Robust Task-Parallel Solution of the Triangular Sylvester Equation. In *Parallel Processing and Applied Mathematics* (2020). To appear in the Proceedings of PPAM-2019, Bialystok, Poland, September 2019.

[4] Mikkelsen, C. C. K., and Karlsson, L. Blocked Algorithms for the Robust Solution of Triangular Linear Systems. In *Parallel Processing and Applied Mathematics* (2018), R. Wyrzykowski, J. Dongarra, E. Deelman, and K. Karczewski, Eds., vol. 10777 of *Lecture Notes in Computer Science*, pp. 68–79. Proceedings of PPAM-2017, Lublin, Poland, September 2017.

[5] Mikkelsen, C. C. K., Alastruey-Benedé, J., Ibáñez-Marín, P., and Risueño, P. G. Accelerating Sparse Arithmetic in the Context of Newton's method for Small Molecules with Bond Constraints. In *Parallel Processing and Applied Mathematics* (2016), R. Wyrzykowski, E. Deelman, J. Dongarra, K. Karczewski, J. Kitowski, and K. Wiatr, Eds., vol. 9573 of *Lecture Notes in Computer Science*, pp. 160–171. Proceedings of PPAM-2015, Krakow, Poland, September 2015.

[6] Karlsson, L., Mikkelsen, C. C. K., and Kågström, B. Improving Perfect Parallelism. In *Parallel Processing and Applied Mathematics* (2014), R. Wyrzykowski, J. Dongarra, K. Karczewski, and J. Waśniewski, Eds., vol. 8384 of *Lecture Notes in Computer Science*, pp. 76–85. Proceedings of PPAM-2013, Warsaw, Poland, September 2013.

[7] Mikkelsen, C. C. K., and Kågström, B. Approximate Incomplete Cyclic Reduction for Systems Which Are Tridiagonal and Strictly Diagonally Dominant by Rows. In *Applied Parallel and Scientific Computing* (2013), P. Manninen and P. Öster, Eds., vol. 7782 of *Lecture Notes in Computer Science*, pp. 250–264. Proceedings of PARA-2012, Helsinki, Finland, June 2012.

[8] Mikkelsen, C. C. K., and Kågström, B. Incomplete Cyclic Reduction of Banded and Strictly Diagonally Dominant Linear Systems. In *Parallel Processing and Applied Mathematics* (2012), R. Wyrzykowski, J. Dongarra, K. Karczewski, and J. Waśniewski, Eds., vol. 7203 of *Lecture Notes in Computer Science*, pp. 80–91. Proceedings of PPAM-2011, Torun, Poland, September 2011.

[9] Mikkelsen, C. C. K., and Kågström, B. Parallel Solution of Narrow Banded Diagonally Dominant Linear Systems. In *Applied Parallel and Scientific Computing* (2012), K. Jónasson, Ed., vol. 7134 of *Lecture Notes in Computer Science*, Springer, pp. 280–290. Proceedings of PARA-2010, Reykjavík, Iceland, June 2010.

Technical reports

[1] Schwarz, A., Mikkelsen, C. C. K., and Karlsson, L. Robust Parallel Eigenvector Computation for the Non-Symmetric Eigenvalue Problem. Technical Report UMINF 20.02, Umeå University, 2020.

[2] Karlsson, L., and Mikkelsen, C. C. K. Negative stride in the column-major format makes sense and has useful applications. Technical Report UMINF 17.17, Umeå University, 2017.

[3] Myllykoski, M., Mikkelsen, C. C. K., Karlsson, L., and Kågström, B. Task-Based Parallel Algorithms for Eigenvalue Reordering of Matrices in Real Schur Form. Technical Report UMINF 17.11, Umeå University, 2017.

[4] Adlerborn, B., Mikkelsen, C. C. K., and Karlsson, L. Towards Highly Parallel and Compute-Bound Computation of Eigenvectors of Matrices in Schur Form. Technical Report UMINF 17.10, Umeå University, 2017.

[5] Mikkelsen, C. C. K., and Karlsson, L. Robust Solution of Triangular Linear Systems. Technical Report UMINF 17.9, Umeå University, 2017.

[6] Mikkelsen, C. C. K. Any positive residual history is possible for the EKSM method for Lyapunov matrix equations. Technical report UMINF-10.04, Umeå University, Department of Computing Science and HPC2N, 2010.

[7] Mikkelsen, C. C. K. Any positive residual history is possible for the Arnoldi method for Lyapunov matrix equations. Technical report UMINF-10.03, Umeå University, Department of Computing Science and HPC2N, 2010.

[8] Mikkelsen, C. C. K. The decay rate of the solution to a tridiagonal linear system with a very special right-hand side. Technical report CSD-08.21, Purdue University, Department of Computer Science, 2008.

[9] Naumov, M., Manguoglu, M., Mikkelsen, C. C. K., Arseniva, A., and Sameh, A. Reliability of Krylov subspace methods - A practical perspective: Part I. Technical report CSD-07.21, Purdue University, Department of Computer Science, 2007.

[10] Naumov, M., Manguoglu, M., Mikkelsen, C. C. K., Arseniva, A., and Sameh, A. Reliability of Krylov subspace methods - A practical perspective: Part II. Technical report CSD-07.22, Department of Computer Science, Purdue University, 2007.

Public dissemination reports

[1] Myllykoski, M., Mikkelsen, C. C. K., Schwarz, A., and Kågström, B. Eigenvalue solvers for nonsymmetric problems. Public dissemination report NLAFET D2.7, Umeå University, 2019.

[2] Mikkelsen, C. C. K., Myllykoski, M., Adlerborn, B., Karlsson, L., and Kågström, B. Eigenvalue problem solvers. Public dissemination report NLAFET D2.5, Umeå University, 2017.