

**Murat Manguoğlu, Associate Professor**

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Research interests:

Parallel Computing and Numerical Linear Algebra

Education:

**Purdue University**, West Lafayette, Indiana, USA Ph.D., Computer Science (and a specialization in Computational Science), May 2009

**The University of Utah**, Salt Lake City, Utah, USA Msc. , Computational Engineering and Science, May 2004

**Middle East Technical University**, Ankara, Turkey, Bsc., Electrical and Electronics Engineering (Honor student), June 2002 (Exchange student at the University of Utah during 2000-2001 academic year)

Academic positions:

Middle East Technical University	Associate Professor	November	2013	-	
Middle East Technical University	Assistant Professor	February	2011	- November	2013
Istanbul Technical University	Assistant Professor	May	2010	- January	2011
Purdue University	Post Doctoral Researcher	May	2009	- May	2010
Purdue University	Research Assistant	January	2005	- May	2009
Purdue University	Teaching Assistant	August	2004	- December	2004
The University of Utah	Teaching Assistant	August	2002	- May	2004

Industry experience and internships:

Intel Corporation, Champaign, IL, USA	May	2008	- August	2008
METU Biomedical Engineering Lab, Ankara, Turkey	June	2000	- August	2000
ERE Telecommunications, Ankara, Turkey	June	1999	- August	1999

Administrative duties:

METU Institute of Applied Mathematics Associate Director	March 2012	-
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Research grants and awards:

Manguoğlu M; **Humboldt Research Fellowship for Experienced Researchers**, 2017

Manguoğlu M (PI); **Turkish Academy of Sciences Distinguished Young Scientist Award** (5/2013-5/2016)

Manguoğlu M (PI); **TUBITAK Career Award** EEAG111E238; (1/5/2012-1/5/2014) ; Parallel Solution of Sparse Linear Systems (118,520 TL)

Manguoğlu M (PI); **METU BAP-08-11-2011-128**; (1/7/2011 - 31/12/2013); Solution of Linear Systems on Parallel Computers (19,832 TL)

Manguoğlu M (Researcher); **The Partnership for Advanced Computing in Europe** First Implementation Phase (PRACE-1IP), European Community's Seventh Framework Programme (FP7/2007- 2013) under grant agreement no: RI-261557; (2/6/2011-2/6/2012) ( €13,356)

Sameh A, Manguoğlu M (co-PI); from **Intel Corporation**; (1/6/2009 - 31/5/2010); Towards an Adaptive Library for Solving Large Sparse Linear Systems (\$100,000)

Manguoğlu M (Researcher); between 2005-2010 various projects; **NSF** (NSF-CCF-0635169), **DARPA/AFRL** (FA8750-06-1-0233), **DOE** (DE-FC52-08NA28617) and **Intel corp.**

Book chapters:

Bölükbaşı ES, Manguoğlu M, "A Multithreaded Recursive and Nonrecursive Parallel Sparse Direct Solver", **Advances in Computational Fluid-Structure Interactions**, Springer-Birkhäuser (editors: Y. Bazilevs and K. Takizawa), 2016

Manguoğlu M, "Parallel solution of sparse linear systems", **High Performance Scientific Computing**, Springer (editors: M. Berry, K. Gallivan, E. Gallopoulos, A. Grama, B. Philippe, Y. Saad and F. Saied), 2012

Peer-reviewed journal (SCI indexed) publications:

Torun FS, Manguoğlu M, Aykanat C, "Parallel minimum norm solution of sparse block diagonal column overlapped underdetermined systems", **ACM Transactions on Mathematical Software**, 43(4), Article 31, 2017

Akay HU, Oktay E, Manguoğlu M, Sivas AA, "Improved Parallel Preconditioners for Multiphysics Topology Optimizations", **International Journal of Computational Fluid Dynamics**, 30 (4), pp. 329-336, 2016

Uzunca M, Karasözen B, Manguoğlu M, "Adaptive discontinuous Galerkin methods for non-linear diffusion-convection-reaction equations", **Computers and Chemical Engineering**, 63, pp.24-37, 2014

Manguoğlu M, "A domain-decomposing parallel sparse linear system solver", **Journal of Computational and Applied Mathematics**, 236(3), pp.319-325, 2011

Dağ H, Yetkin EF, Manguoğlu M, "A new preconditioner design based on spectral division for power flow analysis", **International Review of Electrical Engineering**, 6(3), pp.1339-1348, 2011

Manguoğlu M, Takizawa K, Sameh A, Tezduyar T, "A parallel sparse algorithm targeting arterial fluid mechanics computations", **Computational Mechanics**, 48, pp.377-384, 2011

Manguoğlu M, Saied F, Sameh A, Grama A, "Performance Models for the Spike Banded Linear System Solver", **Scientific Programming**, 19(1), pp.13-25, 2011

Manguoğlu M, Takizawa K, Sameh A, Tezduyar T, "Nested and parallel sparse algorithms for arterial fluid mechanics computations with boundary layer mesh refinement", **International Journal for Numerical Methods in Fluids**, Volume 65, Issue 1-3, pp.135-149, 2010

Naumov M, Manguoğlu M, Sameh A, "A Tearing-based Hybrid Parallel Sparse Linear system Solver", **Journal of Computational and Applied Mathematics**, Volume 234, Issue 10, pp.3025-3038, 2010

Manguoğlu M, Koyuturk M, Sameh A, Grama A, "Weighted Matrix Reordering and Parallel Banded Preconditioners for Iterative Linear System Solvers", **SIAM Journal on Scientific Computing**, 32(3), pp.1201-1216, 2010

Manguoğlu M, Takizawa K, Sameh A, Tezduyar T, "Solution of Linear Systems in Arterial Fluid Mechanics Computations with Boundary Layer Mesh Refinement", **Computational Mechanics**, 46(1), pp.83-89, 2009

Manguoğlu M, Sameh A, Saied F, Tezduyar T, Sathe S, "Preconditioning Techniques for Nonsymmetric Linear Systems in the Computation of Incompressible Flows", **Journal of Applied Mechanics**, 76(2), pp.021204(7 Pages), 2009

Mikkelsen CCK, Manguoğlu M, "Analysis of the Truncated Spike Algorithm", **SIAM Journal on Matrix Analysis and Applications**, 30(4), pp.1500-1519, 2008

Manguoğlu M, Sameh A, Tezduyar T, Sathe S, "A nested iterative scheme for computation of incompressible flows in long domains", **Computational Mechanics**, 43(1), pp.73-80, 2008

Other peer-reviewed journal publications:

Schenk O, Manguoğlu M, Sameh A, Christen M, Sathe M, "Parallel Scalable PDE-Constrained Optimization: Antenna Identification in Hyperthermia Cancer Treatment Planning", **Computer Science Research and Development**, Volume 23, Numbers 3-4/June, 2009

Refereed conference proceedings:

Sivas AA, Manguoglu M, J. H. M. ten Thije Boonkamp, "Discretization and Iterative Schemes for Advection-diffusion-reaction Problems", **Numerical Mathematics and Advanced Applications - ENUMATH 2015**. Lecture Notes in Computational Science and Engineering, Springer, 2016

Karasözen B, Uzunca M, Manguoğlu M, "Adaptive Discontinuous Galerkin Methods for Nonlinear Diffusion-Convection-Reaction Equations." **Numerical Mathematics and Advanced Applications - ENUMATH 2013**. Springer, pp.85-93, 2015

Sattari M, Toroslu İ, Şenkül P, Manguoğlu M, Symeonidis P, Manolopoulos Y, "Geo-activity Recommendations by using Improved Feature Combination", **4<sup>th</sup> International Workshop on Location-Based Social Networks** (September 8, 2012), Pittsburgh, Pennsylvania, USA (<http://doi.acm.org/10.1145/2370216.2370432>)

Manguoğlu M, "A Parallel Sparse Solver and Its Relation to Graphs", **Computational Electromagnetics Workshop** (August 10-13, 2011), Izmir, Turkey ([http://ieeexplore.ieee.org/xpls/abs\\_all.jsp?arnumber=6047337&tag=1](http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6047337&tag=1))

Manguoğlu M, Cox E, Saied F, Sameh A, "TRACEMIN-Fiedler: A Parallel Algorithm for Computing the Fiedler Vector", **Lecture Notes in Computer Science (VECPAR10)**, Volume 6449, pp.449-455, 2011

Brodman JC, Evans GC, Garzaran MJ, Manguoğlu M, Sameh A, Padua D, "A Parallel Numerical Solver Using Hierarchically Tiled Arrays", **Lecture Notes in Computer Science(LCPC2010)**, Volume 6548, pp.46-61, 2011

Manguoğlu M, Saied F, Sameh A, Grama A, "Performance Models for the Spike Banded Linear System Solver", **ISPDC** (July 7-9, 2010), Istanbul, Turkey (<http://doi.ieeecomputersociety.org/10.1109/ISPDC.2010.8>)

Manguoğlu M, "A Parallel Hybrid Sparse Linear System Solver", **Computational Electromagnetics Workshop** (July 19-23, 2009), Izmir, Turkey (<http://ieeexplore.ieee.org/servlet/opac?punumber=5210584>)

Manguoğlu M, Sameh A, and Schenk O,"PSPIKE: A Parallel Hybrid Sparse Linear System Solver", **Lecture Notes in Computer Science (Europar09)**, Volume 5704/2009, pp.797-808, 2008

Refereed conference presentations (with abstracts published):

Torun FS, Manguoglu M, Aykanat C, "Solving Sparse Underdetermined Linear least Squares Problems on Parallel Computing Platforms", **SIAM Conference on Parallel Processing for Scientific Computing** (12-15 April 2016), Paris, France

Akay HU, Oktay E, Manguoglu M, Sivas AA, " Improved Parallel Preconditioners for Multiphysics Topology Optimizations", **27<sup>th</sup> International Conference on Parallel Computational Fluid Dynamics** (17-20 May 2015), Montreal, Canada

Kollias G, Manguoğlu M, Saied F, Sameh A, "TRACEMIN-Fiedler: Reducing the weighted bandwidth of a matrix in parallel", **Preconditioning of Iterative Methods** (1-5 July 2013), Prague, Czech Republic

Tari O, Manguoğlu M, "Revealing the Saddle Point Structure Using the Largest Eigenvector of the Laplacian", **International Conference On Preconditioning Techniques For Scientific And Industrial Applications** (19-21 June 2013), Oxford, UK

Manguoğlu M, "New Parallel Algorithms for Solving Large Sparse Linear Systems", **9<sup>th</sup> International Conference on Large-Scale Scientific Computations** (3-7 June 2013), Sozopol, Bulgaria

Bölükbaşı E, Manguoğlu M, "A new multi-threaded and recursive direct algorithm for parallel solution of sparse linear systems", **5<sup>th</sup> International Conference of the ERCIM working group on Computing and Statistics** (1-5 December, 2012), Oviedo, Spain

Sameh A, Saied F, Schenk O, Manguoğlu M, "Scalable parallel sparse matrix computations", **5<sup>th</sup> International Conference of the ERCIM working group on Computing and Statistics** (1-5 December, 2012), Oviedo, Spain

Gençtav M, Manguoğlu M, "Enhancing parallelism in Monte-Carlo techniques for solving large sparse linear systems", **International Conference on Applied and Computational Mathematics** (October 3-6, 2012), Ankara, Turkey

Manguoğlu M, "New advances in parallel solution of large sparse linear systems", **European Seminar in Computing** (June 25-29, 2012), Pilsen, Czech Republic

Manguoğlu M, Saied F, Sameh A, "Eigensolver-based reordering and parallel traceMIN", **SIAM Conference on Applied Linear Algebra** (June 18-22, 2012), Valencia, Spain

Yetkin EF, Dağ H, Manguoğlu M, "An efficient way to compute the eigenvalues in a specific region of complex plane", **SIAM Conference on Applied Linear Algebra** (June 18-22, 2012), Valencia, Spain

Manguoğlu M, Takizawa, Sameh A, Tezduyar T, "Sparse Matrix Computations in Arterial Fluid Mechanics", **Sparse Days**, (September 6-7, 2011), Toulouse, France

Sameh A, Manguoğlu M, "Towards a Scalable Parallel Sparse Linear System Solver", **Coupled Problems in Science and Engineering**, (June 20-22, 2011), Kos Island, Greece

Manguoğlu M, Takizawa K, Sameh A, Tezduyar T, "A Nested Scheme with Nodal Ordering for Arterial Fluid-structure Interactions", **Coupled Problems in Science and Engineering**, (June 20-22, 2011), Kos Island, Greece

Manguoğlu M, Sathe M, Schenk O, Sameh A, "A Scalable Parallel Preconditioned Sparse Linear System Solver", **International Conference on Preconditioning Techniques for Scientific and Industrial Applications** (May 16-18, 2011), Bordeaux, France

Manguoğlu M, Cox E, Saied F, Sameh A, "Parallel Computation of the Fiedler Vector and Solution of Large Sparse Linear Systems via Banded Preconditioners", **The 7<sup>th</sup> International Conference on Numerical Methods and Applications**(August 20-24, 2010), Borovets, Bulgaria

Cox E, Saied F, Manguoğlu M, Sameh A, "A Split Sparse/Dense Matrix-vector Multiplication Routine", **SIAM Annual Meeting** (July 12-16, 2010), Pittsburgh, Pennsylvania

Schenk O, Manguoğlu M, Sameh A, Christen M, Sathe M, "Parallel Scalable PDE-Constrained Optimization: Antenna Identification in Hyperthermia Cancer Treatment Planning", **Schweizer Numerik Kolloquium** (April 24, 2009), University of Basel, Switzerland

Manguoğlu M, Takizawa K, Sameh A, Tezduyar T, "Novel solvers for Linear systems in Computational Fluid Dynamics", **Computational Methods in Marine Engineering** (June 15-17 2009), Trondheim , Norway

Grama A, Koyuturk M, Manguoğlu M, Sameh A , " Parallel banded preconditioners for non-symmetric linear system solvers" , **5<sup>th</sup> International Workshop on Parallel Matrix Algorithms and Applications** (June 20-22, 2008), Neuchtel, Switzerland

Sameh A, Manguoğlu M, Naumov M, "A tearing-based hybrid parallel sparse system solver", **Computational Methods for Coupled Problems** (June 8-9, 2007), Ischia, Italy

Sameh A, Manguoğlu M, Sathe S, Pausewang J, Tezduyar T, "Iterative schemes for time accurate solution of flow in long domains ", **3<sup>rd</sup> Asian Pasific Congress on Computational Mechanics** (December 3-6, 2007), Kyoto, Japan

Sameh A, Manguoğlu M, Sathe S, Tezduyar T, Saied F, "A Nested Iterative Scheme for Linear Systems in Computational Fluid Dynamics", **International Conference on Preconditioning Techniques for Large Sparse Matrix Problems in Scientific and Industrial Applications** (July 9-12, 2007), Toulouse, France

Sameh A, Manguoğlu M, Sathe S, Pausewang J, Tezduyar T, "Iterative Techniques with Banded Preconditioners for Fluid Mechanics Computations Over Long Domains", **Computational Methods in Marine Engineering** (June 5-7, 2007) , Barcelona, Spain

Sameh A, Manguoğlu M, Sathe S, Tezduyar T, "A Nested Scheme for Nonsymmetric Linear Systems", **Computational Methods for Coupled Problems** (May 21-23, 2007) , Ibiza, Spain

Sameh A, Manguoğlu M, Saied F, "Parallel System Solvers for Navier-Stokes Equations", **Parallel Matrix Algorithms and Applications** (September 7-9, 2006) , IRISA, Rennes, France

Other conference presentations:

Manguoğlu M, "Novel Algorithms for Solving Large Sparse Linear System of Equations in Parallel", **Advances in Computational Fluid-Structure Interaction and Flow Simulations** (March 19-21, 2014), Tokyo, Japan

Manguoğlu M, "Parallel Algorithms for Solution of Large Sparse Linear Systems with Applications", **PRACE Workshop on HPC approaches on life sciences and chemistry**, (February 16-19, 2012), Sofia, Bulgaria

Akaydin B, Manguoğlu M, "Parallel Image Segmentation Using Fiedler Vector", **2<sup>nd</sup> International conference on Pervasive Computing, Signal Processing and Applications** (September 5-7, 2011), Gjøvik, Norway

Sameh A, Manguoğlu M, Sathe M, Schenk O, "A Scalable Parallel Sparse Linear System Solver", **6<sup>th</sup> International Workshop on Parallel Matrix Algorithms and Applications** (June 29 - July 02, 2010), University of Basel, Switzerland

Sameh A, Manguoğlu M, Saied F, "A Scalable Parallel Sparse Linear System Solver", **1075<sup>th</sup> American Mathematical Society Meeting** (March 27-28 2010), Lexington, Kentucky

Manguoğlu M, Koyuturk M, Grama A, Sameh A, "Weighted Matrix Reordering and Parallel Banded Preconditioners for Non-Symmetric Linear Systems" , **SIAM Parallel Processing** (March 12-14, 2008), Atlanta, Georgia

Sameh A, Manguoğlu M, Tezduyar T, Sathe S, "A Parallel Hybrid Sparse System Solver", **ASME International Mechanical Engineering Congress and Exposition** (November 11-15, 2007), Seattle, Washington

Sameh A, Manguoğlu M, Saied F, "A Nested Iterative Linear System Solver", **ASME International Mechanical Engineering Congress and Exposition** (November 5-10, 2006), Chicago, IL

Sameh A, Polizzi E, Manguoğlu M, "Parallel Banded System Solvers and Preconditioners", **Supercomputing** (November 11-17, 2006), Tampa, FL

National conference proceedings:

Sivas AA, Oktay E, Akay HU, Manguoğlu M, "Paralel Topoloji Optimizasyonu Çözümleri için Etkin bir Önkoşullandırıcı", **4. Ulusal Yüksek Başarımlı Hesaplama konferansı** (October 1-2, 2015), Ankara

Manguoğlu M, "Seyrek doğrusal sistemlerin çözümü için yeni algoritmalar", **3. Ulusal Yüksek Başarımlı Hesaplama konferansı** (April 12-13, 2012), Ankara

Gündoğan M, Aykanat C, Manguoğlu M, "Paralel seyrek çözücü ve bunun çizge ve hipercizgelerle olan ilişkisi", **3. Ulusal Yüksek Başarımlı Hesaplama konferansı** (April 12-13, 2012), Ankara

### Technical reports and whitepapers:

Manguoğlu M, "A General sparse linear system solver and its application in OpenFOAM", Partnership for Advanced Computing in Europe (PRACE) Whitepaper, 2012  
([www.prace-project.eu/IMG/pdf/A\\_General\\_Sparse\\_Sparse\\_Linear\\_System\\_Solver\\_and\\_Its\\_Application\\_in\\_OpenFOM.pdf](http://www.prace-project.eu/IMG/pdf/A_General_Sparse_Sparse_Linear_System_Solver_and_Its_Application_in_OpenFOM.pdf))

Mustafa Gündoğan, Cevdet Aykanat, Manguoğlu M, "A Parallel Sparse Hybrid Solver and Its Relationship to Graphs and Hypergraphs", Partnership for Advanced Computing in Europe (PRACE) Whitepaper, 2012  
(<http://www.prace-project.eu/IMG/pdf/aparallelsparsehybridsolveranditsrelationstographsandhypergraphs.pdf>)

Grama A, Manguoğlu M, Koyutürk M, Naumov M, Sameh A, "Evaluating Sparse Linear System Solvers on Scalable Parallel Architectures ", Airforce Research Laboratory, AFRL-RI-RS-TR-2008-273, 2008

Naumov M, Manguoğlu M, Mikkelsen CCK, Arsenieva A, Sameh A, "Reliability of Krylov subspace methods - A practical perspective I", Purdue University, Department of Computer Sciences, CSD TR #07-21, 2007

Naumov M, Manguoğlu M, Mikkelsen CCK, Sameh A, "Reliability of Krylov subspace methods - A practical perspective II", Purdue University, Department of Computer Sciences, CSD TR #07-22, 2007

### Poster presentations:

Salin S, Manguoglu M, Aktulga M, "Learning the Domain of Sparse Matrices", 15th IEEE International Conference on Machine Learning and Applications, Anaheim, CA, December 18-20, 2016

Manguoglu M, Saied F, Sameh A, "SPIKE: A Parallel Scalable Sparse Linear System Solver", SIAM Conference on Parallel Processing for Scientific Computing, Seattle, WA, February 24-26, 2010

Manguoglu M, Saied F, Sameh A, "Scalable Solution of Sparse Linear Systems", PRISM Annual Review Meeting, West Lafayette, IN, October 14-15, 2009

Ananth G, Koyuturk M, Manguoglu M, Sameh A, "WSO Preconditioning Techniques", Supercomputing, Austin, TX, November 15-21, 2008

### Refereeing for scientific journals (SCI indexed journals )

Mathematical Problems in Engineering (2017)  
Turkish Journal of Electrical Engineering and Computer Science (2015,2016)  
Journal of Parallel and Distributed Computing (2015,2016)  
Computers and Mathematics with Applications (2011, 2015,2016)  
Advances in Engineering Software (2016)  
SIAM Journal on Scientific Computing (2014, 2015)  
Digital Signal Processing (2015)  
Numerical Algorithms (2015,2017)  
Computers and Mathematics with Applications (2011, 2015,2016)  
Parallel Computing (2007, 2009,2010, 2011,2014)  
IEEE Transactions on Parallel and Distributed Systems (2014,2011)  
Applied Math Letters (2014)  
Optimization (2013)  
International Journal of Nonlinear Sciences and Numerical Simulation (2013)  
Journal of Computational and Applied Mathematics (2012,2013)  
Electronic Transactions on Numerical Analysis (2012, 2013)  
International Journal of Computer Mathematics (2012)  
Engineering Computations (2011)  
Computers and Electrical Engineering (2010)  
ACM Transactions on Mathematical Software (2011)

Other refereeing work:

TUBITAK 1001/3501 reasearch project referee (2015)  
IEEE International Parallel & Distributed Processing Symposium Conference (2015)  
Supercomputing Conference (2015)  
TUBITAK 1001/3501 reasearch project referee (2014)  
CHIST-ERA (2014)  
Scientific Reports (2013)  
TUBITAK 2238 (high school) referee (2013)  
TUBITAK 2238 (undergraduate) referee (2013)  
TUBITAK 1001/3501 reasearch project referee (2013)  
Research Park application referee for Istabul University (2013)  
KOSGEB Project Referee (2013)  
Research Park application referee for METU (2012)  
Research and Devolpment Center Application referee for Ministry of Science, Industry and Technology (2012)  
COMPSAC 2012 - The IEEE Conference on Computer Software and Applications (2012)  
ELECO 2012 – Electrical, Electronics and Computer Engineering Conference (2012)

Conference and workshop organization:

European Conference on Numerical Mathematics and Advanced Applications, September 14-18, 2015, <http://enumath2015.iam.metu.edu.tr/>

4<sup>th</sup> National High Performance Computing Conference, October 1-2, 2015, <http://www.basarim.org.tr/2015/>

3<sup>rd</sup> National High Performance Computing Conference, April 12-14, 2012, <http://www.basarim.org.tr/2012>

Parallel Algorithms and Programming on GPUs, December 18-19 2010, <http://gggpu.uybhm.itu.edu.tr/page.php?id=12>

Conference technical program committee membership:

The 2014 International Conference on Advances in Social Networks Analysis and Mining, August 17-20, 2014, <http://www.asonam2014.org/>

The 2013 International Conference on Advances in Social Networks Analysis and Mining, August 25-28 2013, <http://asonam.cpsc.ucalgary.ca/>

High-capacity Optical Networks & Emerging /Enabling Technologies, December 12-14, 2012, <http://honet.uncc.edu/>

The 2012 International Conference on Advances in Social Networks Analysis and Mining, August 26-29 2012, <http://asonam2012.etu.edu.tr/>

Computational Electromagnetics Workshop, August 10-13 2011, <http://www.cem.bilkent.edu.tr/CEM11.html>