Yerlan Amanbek

CONTACT yerlan@utexas.edu Astana, Kazakhstan.

EDUCATION

Ph.D., Computational Science, Engineering & Math, **UT Austin**, USA. 2018
Thesis: *A New Adaptive Modeling of Flow and Transport in Porous Media using an Enhanced Velocity Scheme*
Advisor: Dr. Mary F. Wheeler.
Adaptive methods using upscaling and domain decomposition for flow & transport. A *priori* and a *posteriori* error analysis for EVMFEM theoretically and numerically.

M.Sc., IT, **Nanyang Technological University**, Singapore. 2009
Thesis: *Adoption of e-Government in the Republic of Kazakhstan*
Advisor: Dr. M. Tan.
We conducted quantitative research through the web-based survey to get the perception towards the portal. The Technology Acceptance Model is used as a model to measure attitude toward technology adoption in multiple domains. Data analysis were performed by Statistical Tools(SPSS).

B. Sc. with honors, Applied Mathematics and Computer Science, **Al-Farabi Kazakh National University**, Almaty, Kazakhstan. 2006
Diplom work: *A modified incompressible Novier-Stockes equations in 2D*
Advisor: Dr. N. Danayev

RESEARCH INTERESTS

Numerical modeling: domain decomposition, discretization schemes, multiscale methods, a posteriori and a priorri error analysis, robust and efficient solution algorithms.

AWARDS

Graduate School Summer Fellowship, University of Texas at Austin, USA 2018

Texas Applied Math & Eng Symposium (TAMES) **Poster Award**, USA 2017

Research Experience Carbon Sequestration Program Award, USA 2017

SIAM Travel Award, USA 2017

CIME-Foundation and CIRM Grant, Italy 2016

Talap Scholarship, Kazakhstan 2013

PUBLICATIONS

1. Amanbek, Y., Singh, G., Wheeler, M. F., and van Duijn, H. (2019). "Adaptive Numerical Homogenization for Upscaling Single Phase Flow and Transport". Journal of Computational Physics 387, 117 - 133 (2019) https://doi.org/10.1016/j.jcp.2019.02.014

2. Singh, G., Amanbek, Y. and Wheeler, M. F. "Adaptive Homogenization for Upscaling Heterogeneous Porous Medium" SPE-187113-MS, *SPE Annual Technical Conference and Exhibition*, Oct 9-11, 2017, San Antonio, Texas. https://doi.org/10.2118/187113-MS

3. Amanbek, Y., Singh, G., and Wheeler, M. F. (2019). Recovery of the Interface Velocity for the Incompressible Flow in Enhanced Velocity Mixed Finite Element Method. arXiv preprint arXiv:1901.04401.(submitted)

4. Amanbek, Y., and Wheeler, M. (2018). A priori error analysis for transient problems using Enhanced Velocity approach in the discrete-time setting. arXiv preprint arXiv:1812.04809.(submitted)

5. Amanbek, Y., Singh, G., Pencheva, G. and Wheeler, M.F. "A posteriori error estimates for Enhanced Velocity MixedFEM for flow problems in heterogeneous porous media."(in preparation)

6. Amanbek, Y., Balgayev, I., Batyrkhanov, K., and Tan, M. (2018). Adoption of e-government in the Republic of Kazakhstan. arXiv preprint arXiv:1802.06951. (submitted)

Conference & Invited Talks

1. G. Singh, Y. Amanbek and M. F. Wheeler, *Adaptive Homogenization for Upscaling Heterogeneous Porous Medium*, SPE ATCE, Oct 9-11, 2017, San Antonio, Texas.

2. Y. Amanbek, G. Singh, G. Pencheva and M. F. Wheeler, *Adaptive multiscale method on flow and reactive transport using numerical homogenization and Enhanced Velocity Mixed FEM*, Texas Applied Mathematics and Engineering Symposium, September 23-25, 2017, The University of Texas at Austin, Austin, Texas.

3. Y. Amanbek, G. Singh and M. F. Wheeler, *Modeling flow and transport using Enhanced Velocity Mixed FEM and Numerical Homogenization*, Finite Element Rodeo, March 3-4, 2017, University of Houston, Houston, Texas.

4. Y. Amanbek, G. Singh and M. F. Wheeler, *Multiscale Methods for Flow and Transport in Porous Media*, SIAM Conference on Computational Science and Engineering (CSE17), February 26-March 3, 2017, Atlanta, Georgia.

5. G. Singh, G. Pencheva, A. Venkatraman, Y. Amanbek, and M. F. Wheeler, *A Fully Implicit Framework for Coupled Reactive Flow and Transport*, 26th Annual Industrial Affiliates Meeting, Center for Subsurface Modeling, November 1-2, 2016, The University of Texas at Austin, Austin, Texas.

6. G. Singh, Y. Amanbek, and M. F. Wheeler, *Upscaling Reservoir Properties using Single Well Tracer Tests*, Computational Methods in Water Resources. June, 2016, University of Toronto, Canada.

7. Y. Amanbek, G. Singh and M. F. Wheeler *Upscaling Flow and Transport using Two-Scale Homogenization*, Finite Element Rodeo, March 4-5, 2016, Texas A&M, College Station, Texas.

8. G. Singh, Y. Amanbek, M. F. Wheeler, *Addressing Challenges in Flow Modeling for Fractured Reservoirs*, 25^{th} Annual Industrial Affiliates Meeting, Center for Subsurface Modeling, November 3-4, 2015, The University of Texas at Austin, Austin, Texas.

9. Y. Amanbek, Sh. Musiralieva, *RSA ALGORITHM. CRYPTO ANALYSIS.* 60^{th} Scientific Conference , April, 2006, Al-Farabi Kazakh National University, Almaty, Kazakhstan.

Research Posters

1. "A posteriori error analysis of Enhanced Velocity Mixed FEM for flow in heterogeneous porous media", Y. Amanbek, G. Singh, G. Pencheva and M. F. Wheeler, Annual Industrial Affiliates Meeting, April 11-12, 2018, Center for Subsurface Modeling, The University of Texas at Austin, Texas.

2. "Adaptive Numerical Homogenization for Upscaling Single Phase Flow and Transport", Y. Amanbek, G. Singh and M. F. Wheeler, Texas Applied Mathematics and Engineering Symposium (TAMES), September 21-23, 2017, Austin, Texas.

3. "Selective Time-stepping adaptivity for Non-Linear Reactive Transport Problems", Y. Amanbek, G. Singh and M. F. Wheeler, SIAM Conference on Computational Science and Engineering (CSE17), February 26-March 3, 2017, Atlanta, Georgia.

4. "Adaptive Time-stepping for Non-Linear Reactive Transport Problems", Y. Amanbek, G. Singh and M. F. Wheeler, 26^{th} Annual Industrial Affiliates Meeting, November 1-2, 2016, Center for Subsurface Modeling, The University of Texas at Austin, Austin, Texas.

5. "Upscaling Reactive Flow and Transport using Two-Scale Homogenization", Y. Amanbek, G. Singh, C. J. van Duijn, and M. F. Wheeler, 25^{th} Annual Industrial Affiliates Meeting, November 3-4, 2015, Center for Subsurface Modeling, The University of Texas at Austin, Austin, Texas.

Participated Conferences, Workshops, Summer School

Fall 2017 Teaching Preparation Series, Faculty Innovation Center, The University of Texas at Austin, Austin, USA.

Research Experience in Carbon Sequestration (RECS) training program on *"Carbon Capture, Utilization and Storage (CCUS)"*, July 22-29, 2017, Alabama, USA.

8^{th} annual conference on *"Scientific Software Days Conference"*, April 27-28, 2017, Austin, USA.

ICES workshop on *"Advances in Computational Sciences and Engineering: A conference in honor of the 80*$^{\text{th}}$ *birthday of Prof. J. Tinsley Oden"*, March 20-21, 2017, Austin, USA.

SPE-SIAM workshop on *"Advances in Data-Driven Analytics Applications: From Methodology to Technology"*, December 9, 2016, Houston, USA.

CIME-CIRM Course on *"New Trends in non-Newtonian Fluid Mechanics and Complex Flows"*, August 29-September 2, 2016, Levico Terme, Italy.

Research Experience

Nazarbayev University(NU) Sep 2018 to Current

Postdoctoral Scholar in Math Department, School of Technology and Science

- Lecture Calculus 1 as Instructor.
- Research work on subsurface flow and transport modeling.
- Team Leader of NU Math Olympiad Team.

Center for Subsurface Modeling, Institute for Computational Engineering and Sciences(ICES) 2014 to 2018

Research Assistant

- Developed adaptive numerical homogenization method for flow and transport model at reduced computational cost. Poster of this work was awarded in the Texas Applied Math & Eng Symposium.
- Derived and conducted a priori error analysis for slightly compressible flow using EVMFEM in continuous and discrete time cases.
- Time domain decomposition methods for flow and transport in heterogeneous porous media problems. Poster was presented in SIAM Conference on Computational Science and Engineering at Atlanta.
- Developed a posteriori error estimate for EVMFEM. This is a great in practical applications in adaptive mesh refinement.
- Presented research outcomes to industry professionals.

Nazarbayev University April 2011 to Aug 2011

Lab Assistant, Center for Energy Research, Astana, Kazakhstan.

- Developed and implemented the website for CER to reach broader audience and to open doors for international collaboration.
- Developed and implemented the evaluation system of the CER employers. This helped to improve performance of organization.

- Mentored an undergraduate Stanford student on improving web-based skills during summer internship.

Nanyang Technological University Jun 2008 to Jul 2008

Research Assistant, School of Communication and Information, Singapore.

- Assist in the implementation, development, and improvement of web-based system of the school publication database.
- Implemented the search function of the publication database.
- Improved and adjusted the given data in appropriate format.

Teaching Experience

Nazarbayev University(NU) Aug 2011 to Aug 2013

Teacher Assistant in Math Department, School of Technology and Science

- Lectured Calculus 1 as Instructor (one semester).
- Graded homework & quizes, lead recitation of Calculus 1-3, Discrete Mathematics.
- Facilitated Math Club activities.

High Schools Sep 2003 to May 2006

Teacher in Advanced Math Courses, Almaty, Kazakhstan.

- Prepared students for Internatinal/National Math Olympiads,
- Lead problem solving sessions.

Service

Reviewer for peer-reviewed journals: Journal of Computational Physics 2019

Leader of the Nazarbayev University Team at Al-Khorezmi International Mathematical Olympiad 2018, Urgench, Uzbekistan 2018

Leader of the Nazarbayev University Team at 19^{th} & 20^{th} International Mathematics Competition for University Students, Blagoevgrad, Bulgaria 2012 and 2013

Jury at 51^{st} International Mathematical Olympiad, Astana, Kazakhstan 2010

Leader of the Kazakhstan Team at 10^{th} Junior Balkan Mathematical Olympiad, Chisinau, Republic of Moldova 2006

Team Leader at the 2^{nd} International Zhautykov Olympiad on Mathematics and Physics, Almaty, Kazakhstan 2006

Professional Experience

Externship April 2018

Schlumberger Sugar Land Campus, Houston.

- Visited Schluberger's Engineering, Manufacturing and testing facilities: Got on drilling rig platform and recognized facilitates including drilling tools and terminology used in field operations, Viewed measuring the real-time formation pressure at facility with manufactured reservoir condition.
- Interacted with field supervisors to have a better understanding of realistic situations in the field. Also, I was able to learn about the Schlumberger service role in the upstream and midstream aspect of oil and gas industry.

Kazakhtelecom Dec 2009 to Aug 2010

Department Information System

- Assist in the implementation, development, and improvement of e-school and learning managment systems for high schools.

- Presented end-user(teachers) and delivered the system.

Bank Centercredit Aug 2006 to Sep 2007

Specialist, Center Management Resource Treasure Department, Almaty, Kazakhstan.

- Implemented scripts using VBA and SQL to validate different systems outcome and to generate reports.
- Optimized and redesigned the system to process data.

PROFICIENCY

Programming: C/C++, VBA, Pascal.
Reservoir Simulators: IPARS, CMG.
Scientific Toolboxes: Matlab, LaTeX, Mathematica, SPSS.
FEM Library: dealII, http://dealii.org.
Others: HTML, Joomla, Dreamweaver, Apache.

LANGUAGES

Kazakh, English, Russian

MEMBERSHIP

Society of Petroleum Engineers (SPE)
Society of Industrial and Applied Mathematics (SIAM)

INTERESTS AND HOBBIES

Swimming, Hiking, Volleyball, Soccer.