

# Yerlan Amanbek

CONTACT	yerlan@utexas.edu	Nur-Sultan, Kazakhstan.
EDUCATION	Ph.D., Computational Science, Engineering & Math, <b>UT Austin</b> , USA. 2018 Thesis: <i>A New Adaptive Modeling of Flow and Transport in Porous Media using an Enhanced Velocity Scheme</i> Advisor: Dr. Mary F. Wheeler.  M.Sc., IT, <b>Nanyang Technological University</b> , Singapore. 2009 Thesis: <i>Adoption of e-Government in the Republic of Kazakhstan</i> Advisor: Dr. M. Tan.  B. Sc. with honors, Applied Mathematics and Computer Science, <b>Al-Farabi Kazakh National University</b> , Almaty, Kazakhstan. 2006 Diplom work: <i>A modified incompressible Navier-Stokes equations in 2D</i> Advisor: Dr. N. Danayev	
RESEARCH INTERESTS	<i>Numerical modeling</i> : domain decomposition, discretization schemes, multiscale methods, a posteriori and a priori error analysis, robust and efficient solution algorithms in reservoir simulation through porous media.	
RESEARCH GRANTS	Role: Principle Investigator, Faculty Development Competitive Research Grants, Nazarbayev University, Kazakhstan	2019-2021 (\$60K)
AWARDS	Graduate School Summer Fellowship, University of Texas at Austin, USA	2018
	Texas Applied Math & Eng Symposium (TAMES) <b>Poster Award</b> , USA	2017
	Research Experience Carbon Sequestration Program Award, USA	2017
	Society for Industrial & Applied Mathematics(SIAM) Travel Award, USA	2017
	CIME-Foundation and CIRM Grant, Italy	2016
	Talap Scholarship for Graduate Program, Kazakhstan	2013
PUBLICATIONS	<ol style="list-style-type: none"><li>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. <a href="https://doi.org/10.1016/j.jcp.2019.02.014">https://doi.org/10.1016/j.jcp.2019.02.014</a></li><li>Amanbek, Y., and Wheeler, M. F. (2019). A priori error analysis for transient problems using Enhanced Velocity approach in the discrete-time setting. Journal Of Computational And Applied Mathematics, 361, 459-471. <a href="https://doi.org/10.1016/j.cam.2019.05.009">https://doi.org/10.1016/j.cam.2019.05.009</a></li><li>Amanbek Y., Singh G., Wheeler M.F. (2019) Recovery of the Interface Velocity for the Incompressible Flow in Enhanced Velocity Mixed Finite Element Method. In: Rodrigues J. et al. (eds) Computational Science – ICCS 2019. ICCS 2019. Lecture Notes in Computer Science, vol 11539. Springer, Cham. (<b>A-rank</b> conference) <a href="https://doi.org/10.1007/978-3-030-22747-0_38">https://doi.org/10.1007/978-3-030-22747-0_38</a></li><li>Singh, G., Amanbek, Y. and Wheeler, M. F. “Adaptive Homogenization for Upscaling Heterogeneous Porous Medium” SPE-187113-MS, <i>SPE Annual Technical Conference and Exhibition</i>, Oct 9-11, 2017, San Antonio, Texas. <a href="https://doi.org/10.2118/187113-MS">https://doi.org/10.2118/187113-MS</a></li><li>Amanbek, Y., Singh, G., Pencheva, G. and Wheeler, M.F. “Error indicator for the incompressible Darcy flow problems using Enhanced Velocity Mixed Finite Element Method”.(submitted)</li></ol>	

CONFERENCE  
& INVITED  
TALKS

1. Y. Amanbek, G. Singh, G. Pencheva and M. F. Wheeler, *A posteriori error estimates for flow modeling using Enhanced Velocity scheme*, InterPore, May 6-10, 2019, Valencia, Spain.
2. G. Singh, Y. Amanbek and M. F. Wheeler, *Adaptive Homogenization for Upscaling Heterogeneous Porous Medium*, SPE ATCE, Oct 9-11, 2017, San Antonio, Texas.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. G. Singh, Y. Amanbek, M. F. Wheeler, *Addressing Challenges in Flow Modeling for Fractured Reservoirs*, 25<sup>th</sup> Annual Industrial Affiliates Meeting, Center for Subsurface Modeling, November 3-4, 2015, The University of Texas at Austin, Austin, Texas.
10. Y. Amanbek, Sh. Musiralieva, *RSA ALGORITHM. CRYPTO ANALYSIS*. 60<sup>th</sup> 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<sup>th</sup> 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<sup>th</sup> 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<sup>th</sup> 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<sup>th</sup> 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 present

Postdoctoral Scholar in Math Department, School of Science and Technology

- 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	<b>Nazarbayev University(NU)</b>	Aug 2011 to Aug 2013
	Teacher Assistant in Math Department, School of Technology and Science <ul style="list-style-type: none"> <li>- Lectured Calculus 1 as Instructor (one semester).</li> <li>- Graded homework &amp; quizzes, lead recitation of Calculus 1-3, Discrete Mathematics.</li> <li>- Facilitated Math Club activities.</li> </ul>	
	<b>High Schools</b>	Sep 2003 to May 2006
	Teacher in Advanced Math Courses, Almaty, Kazakhstan. <ul style="list-style-type: none"> <li>- Prepared students for Internatinal/National Math Olympiads,</li> <li>- Lead problem solving sessions.</li> </ul>	
ACADEMIC SERVICE	<b>Reviewer for peer-reviewed journals:</b>	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 <sup>th</sup> & 20 <sup>th</sup> International Mathematics Competition for University Students,	Blagoevgrad, Bulgaria 2012 and 2013
	Jury at 51 <sup>st</sup> International Mathematical Olympiad,	Astana, Kazakhstan 2010
	Leader of the Kazakhstan Team at 10 <sup>th</sup> Junior Balkan Mathematical Olympiad,	Chisinau, Republic of Moldova 2006
	Team Leader at the 2 <sup>nd</sup> International Zhautykov Olympiad on Mathematics and Physics,	Almaty, Kazakhstan 2006
PROFESSIONAL EXPERIENCE	<b>Externship</b>	Apr 2018
	Schlumberger Sugar Land Campus, Houston. <ul style="list-style-type: none"> <li>- 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.</li> <li>- 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.</li> </ul>	
	<b>Kazakhtelecom</b>	Dec 2009 to Aug 2010
	Department Information System <ul style="list-style-type: none"> <li>- Assist in the implementation, development, and improvement of e-school and learning managment systems for high schools.</li> <li>- Presented end-user(teachers) and delivered the system.</li> </ul>	
	<b>Bank Centercredit</b>	Aug 2006 to Sep 2007
	Specialist, Center Management Resource Treasure Department, Almaty, Kazakhstan. <ul style="list-style-type: none"> <li>- Implemented scripts using VBA and SQL to validate different systems outcome and to generate reports.</li> <li>- Optimized and redesigned the system to process data.</li> </ul>	
PROFICIENCY	<i>Programming:</i> C/C++, VBA, Pascal. <i>Reservoir Simulators:</i> IPARS, CMG. <i>Scientific Toolboxes:</i> Matlab, L <sup>A</sup> T <sub>E</sub> X, Mathematica, SPSS. <i>FEM Library:</i> dealII, <a href="http://dealii.org">http://dealii.org</a> . <i>Others:</i> 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.