Yerbol Palzhanov
Research Scientist, PhD
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ABOUT ME

Dedicated professional with a strong background in scientific software development, specializing in C++ for numerical linear algebra, numerical analysis, and finite element methods. Contributed to a C++ finite element package with 5 peer-reviewed journal publications. Experienced in parallel programming, MPI, OpenMP, CUDA, machine learning for physics, and deep learning using TensorFlow.

EDUCATION

2019 - 2023	Ph.D in Computational Science, University of Houston, Houston, TX *thesis: Numerical finite element methods for phase field equations* *advisors: M. Olshanskii; A. Quaini*
2015 - 2017	M.S. in Mathematics, Atyrau State University, Atyrau, Kazakhstan *thesis: Numerical methods based on energy minimization principle for computing thermal fields* *advisor: B. Kenzhegulov*
2008 - 2012	B.S. in Mathematics, Auezov University, Shymkent, Kazakhstan

SELECTED PUBLICATIONS

My profile at Google scholar.

3. *A scalar auxiliary variable unfitted FEM for the surface Cahn-Hilliard equation*, M. Olshanskii, Y. Palzhanov, A. Quaini – Journal of Scientific Computing, Oct 2023
2. *Lipid domain coarsening and fluidity in multicomponent vesicles: A continuum model and its experimental validation*, Y. Wang, Y. Palzhanov, A. Quaini, M. Olshanskii, S. Majd – BBA - Biomembranes, 2022
1. *A decoupled, stable, and linear FEM for a phase-field model of variable density two-phase incompressible surface flow*, Y. Palzhanov, A. Zhiliakov, A. Quaini, M. Olshanskii – Computer Methods in Applied Mechanics and Eng., 2021

EXPERIENCE

Graduate Researcher @ University Of Houston 2019 – 2024

- Developing Navier–Stokes–Cahn–Hilliard model for two-phase surface flows
  - Contributed to finite element C++ package DROPS - CFD tool for simulating two-phase flows to model flows
  - Integrated the collection of scientific software libraries Trilinos(BELOS, AMESOS2, EPETRA) to solve systems of linear equations with Flexible GMRES
  - *Tools & Frameworks:* C++, MPI, Trilinos, Parallel Computing, Linux, CMAKE, GIT, Paraview
- Modeling and experimenting with multicomponent lipid vesicles
  - Implemented unconditionally energy stable *scalar auxiliary variable* algorithm for phase field equations
  - Studied fusogenicity of positively charged lipid vesicles via thermodynamically consistent NSCH H-model
  - *Tools & Frameworks:* MATLAB, Python, DROPS, Cluster & Cloud Computing
- Reduced order modeling with Convolutional Autoencoders, LSTM, and Transformers
  - Developed convolutional autoencoder neural network for order reduction of advection-dominated 2D flows
  - Implemented LSTM for temporal evolution prediction of rising thermal bubble
  - *Tools & Frameworks:* OpenFoam, Tensorflow, Cluster & Cloud Computing

Academic Vice-Principal @ Bilim-Innovation Lyceums 2012 - 2019

- Trained national IMO(International mathematics olympiads) team members, best result: gold medalist.
- Served as an academic vice-principal in Atyrau BIL, listed in TOP-5 schools in Kazakhstan.

CERTIFICATES

TensorFlow Developer certificate

Hands-on four-course Professional Certificate program, on Convolutional Neural Networks, Natural Language Processing (NLP) and Time Series Analysis in Tensorflow.

CONFERENCES & TALKS

4. Talk @ 6th Annual Meeting of the SIAM Texas-Louisiana Section
   Topic: A scalar auxiliary variable unfitted FEM for the surface Cahn-Hilliard equation
   University of Louisiana, Lafayette, LA, November 3-5, 2023
3. Talk @ 5th Annual Meeting of the SIAM Texas-Louisiana Section
   University Of Houston, Houston, TX, November 4-6, 2022
2. Talk @ Graduate Student Paper Presentation (GSPP)
   Topic: Simulating lipid domain coarsening with TraceFEM
   University Of Houston, Houston, TX, April 29, 2022
1. Talk @ SMU Finite Element Rodeo
   Topic: Finite Element Methods for Surface Navier-Stokes-Cahn-Hilliard Equations
   Southern Methodist University, Dallas, TX, March 4-5, 2022