Yerbol Palzhanov
Computational Scientist, PhD
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Education

2019 - 2023 Ph.D in Computational Science, University of Houston, Houston, TX
2015 - 2017 M.S. in Mathematics, Atyrau State University, Atyrau, Kazakhstan
2008 - 2012 B.S. in Mathematics, Auezov University, Shymkent, Kazakhstan

Experience

2019 - 2023 Graduate Research Assistant @ University Of Houston
2011 - 2019 Vice-Principal, Mathematics Teacher @ Bilim-Innovation High Schools

Projects - Fluid Dynamics & Finite Element Methods

Navier-Stokes-Cahn-Hilliard equation on surfaces

- Developing Trace FEM discretization for Navier–Stokes–Cahn–Hilliard model for two-phase surface flows
- Experimenting the coarsening and fluidity in multicomponent lipid vesicles using NSCH model
- Used DROPS - CFD tool for simulating two-phase flows (C++) to model flows
- Used package Trilinos(BELOS, AMESOS2, EPETRA) to solve systems of linear equations with Flexible GMRES
- Extended knowledge of MATLAB and Paraview, VTK to process the data and visualize
- FEA packages: DEALii, OpenFoam, NGSolve, FEniCS

Scalar Auxiliary Variables

Implementing new unconditionally energy stable numerical method with Scalar Auxiliary Variable for gradient flows on sphere.

Machine Learning and Data Science Skills

Robust Principal Component Analysis for Modal Decomposition of Corrupt Fluid Flows

Implementing robust PCA in Python, comparing to dynamic mode decomposition(DMD), using RPCA on PIV data from experiments, SVD, POD

Tensorflow

Working experience with Keras, Convolutional Neural Networks, DNN, RNN, Time-Series Analysis, NLP, Implementing ML models and deployment, TensorflowJS, Tensorflow LITE

Courses

Pattern recognition, Machine Learning, Dynamical Systems and Control

SVD • Fourier and Wavelet Tranforms • Sparsity • SINDy • Reduced order models (ROM) • DMD

DeepLearning.AI TensorFlow Developer

Course certificate

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

Leadership and Mentoring Experience

- Trained IMO(International mathematics olympiads) gold medalist.
- Served as an academic vice-principal in Atyrau BIL, TOP-5 olympiad schools in Kazakhstan.
- Developed curriculum for building value-based school culture.

Skills

Numerical analysis:	Finite element methods • Numerical optimization • Preconditioners,
Machine Learning:	Tensorflow • Keras • Scikit-learn • Pandas • Numpy
Programming Languages:	C/C++ • Python • MATLAB • Wolfram Mathematica • R
Packages & Softwares:	DROPS • DEALii • Paraview • VTK • Trilinos • Git
Languages:	Kazakh • English • Russian • Turkish
Other:	3D modeling • Blender • Unity • Agent-Based Simulation • Crowd-behaviour

Publications

5. *A scalar auxiliary variable unfitted FEM for the surface Cahn-Hilliard equation*,
   M. Olshanskii, Y. Palzhanov, A. Quaini,
   Preprint, Jun 2023
4. *On fusogenicity of positively charged phased-separated lipid vesicles: experiments and computational simulations*,
   Y. Wang, Y. Palzhanov, D Dang, A. Quaini, M. Olshanskii, S. Majd,
   Preprint, Aug 2023
3. *Lipid domain coarsening and fluidity in multicomponent lipidvesicles: A continuum based model and its experimental validation*,
   Y. Wang, Y. Palzhanov, A. Quaini, M. Olshanskii, S. Majd
   Biochimica et Biophysica Acta(BBA) - Biomembranes, 2022
2. *A comparison of Cahn-Hilliard and Navier-Stokes-Cahn-Hilliard models on manifolds*,
   M. Olshanskii, Y. Palzhanov, A. Quaini
   Vietnam Journal of Mathematics, 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 Engineering, 2021

Conferences & Talks

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