Mansur Shakipov

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Education

Aug 2020 – present	**PhD in Applied Mathematics** University of Maryland, College Park, MD, US Concentration on Scientific Computing, Adviser: Dr. Ricardo H. Nochetto.
Aug 2016 – Jun 2020	**BS in Computer Science** Nazarbayev University, Nur-Sultan, Kazakhstan Second major in Mathematics.

Work Experience

Jan 2021 – present (excluding summers)	**Graduate Teaching Assistant** University of Maryland, College Park.
Jun 2022 – Aug 2022	**Graduate Research Assistant** University of Maryland, College Park.
Jun 2021 – Aug 2021	**Graduate Research Assistant** Nazarbayev University, Nur-Sultan, Kazakhstan. Supervisors: Dr. Dichuan Zhang, Dr. Dongming Wei.
Jun 2019 – Aug 2019	**Visiting Academic** (internship) Courant Institute of Mathematical Sciences, NYC, NY, USA. Supervisor: Dr. Aleksandar Donev.
Aug 2018 – May 2019	**Research Assistant** Nazarbayev University, Nur-Sultan, Kazakhstan. Supervisor: Dr. Piotr Skrzypacz.

Projects

Jun 2022 – present	**Simulating PDEs on surfaces** University of Maryland, MD, USA. I wrote scientific computing codes that simulate different PDEs on implicitly defined static surfaces. The list of PDEs include Laplace-Beltrami, Heat, Stokes and Navier-Stokes equations. The code is written using `ngsxfem` add-on to NGSolve library. The finite element method used is TraceFEM. All the major routines like system assembly and linear solver are parallelizable. ***Project adviser: Dr. Ricardo H. Nochetto.***
Jun 2021 – Aug 2021	**Multilayer inertial reactive armor** Nazarbayev University, Nur-Sultan, Kazakhstan. We are working on producing realistic simulation of the graphene armor under impact loading. I have implemented a FEM scheme that solves a semilinear version of the (static and dynamic) Euler-Bernoulli beam equation corresponding to 1) swelling force, 2) nonlinear stress-strain relation for graphene in Matlab. ***Supervisors: Dr. Dongming Wei, Dr. Dichuan Zhang.***
Aug 2019 – Dec 2020	**cheML.io: An Online Database of ML-generated Molecules** Nazarbayev University, Nur-Sultan, Kazakhstan. We investigated the properties of molecules generated by several state-of-the-art ML algorithms; combined them into a single database, and developed a web application, where users can seamlessly interact with the database. That includes molecule search, results download, and on-demand molecule generation. My input was building the first minimum working prototype, and back-end. ***Supervisors: Dr. Siamac Fazli, Dr. Vsevolod Peshkov.***
Nov 2019 – May 2020	**Finite Element Method for Retaining Walls Subjected to Swelling Pressure** Nazarbayev University, Nur-Sultan, Kazakhstan. Retaining walls are constructions that separate two levels of soil. The purpose of this capstone project is to model the deflection of retaining walls subjected to a swelling pressure, which occurs due to expansion of soil. This problem was modelled by a semilinear Euler-Bernoulli beam equation, which was treated using FEM and implemented in pure Python and `numpy`. ***Supervisor: Dr. Dongming Wei.***

Jun 2019 – Aug 2019 **Dynamics of colloidal particles driven by magnetic field**
NYU Courant, NYC, NY, USA.
I worked on parallelization of a Fortran 90 code which implements Finite Volume Method to simulate the movement of colloidal particles driven by a magnetic field rotating around the axis parallel to the floor. Using OpenMP framework for these purposes, I managed to achieve sub-linear speed-up. I also ran simulations on a multi-core processor and a GPU, and analyzed the results.
Supervisor: Dr. Aleksandar Donev

Aug 2018 – May 2019 **Dead-core solutions to simple catalytic reaction problems in chemical engineering**
Nazarbayev University, Nur-Sultan, Kazakhstan.
We investigated the solutions of a semilinear diffusion-reaction equation, which models the density distribution of a catalyst inside a porous pellet inside a chemical reactor. Chemical reaction can occur very fast close to the external surface of a pellet causing all reactant to be consumed, resulting in a deadcore: an area where no reaction occurs. This can lead to inefficient use of an expensive catalyst. In this project, we investigated the deadcore solutions of a 1-d version of the problem.
Supervisors: Dr. Piotr Skrzypacz, Dr. Boris Golman.

Scholarships and Grants

Apr 2020 **Fellowship and Dean's Stipend**
I was offered a GA position, tuition remission and Dean's stipend (for the first two years) to pursue PhD in Mathematics at the University of Maryland, College Park.

Jan 2019 **Summer Research Internship Funding** ($\sim$ \$8,000)
A selective grant issued by Shakhmardan Yessenov Foundation to 2-3 year undergraduate students from Kazakhstan, about 10 grants a year.

Jun 2016 **Full scholarship and stipend**
to pursue BSc in Computer Science at Nazarbayev University in Astana, Kazakhstan.

Jun 2016 **Altyn Belgi** (Golden Sign)
Issued by the Department of Education of Kazakhstan to students who finished middle- and highschool with a GPA of 4.0.

Jan 2013 **Full scholarship** (highschool)
A merit-based scholarship to study at Nazarbayev Intellectual School in Karaganda, Kazakhstan.

Publicaitions

R. Zhumagambetov, D. Kazbek, M. Shakipov, D. Maksut, V. A. Peshkov, and S. Fazli, "cheML.io: an online database of ML-generated molecules," *RSC Adv.*, vol. 10, pp. 45189–45198, 2020.

F. Sabit, M. Shakipov, P. Skrzypacz, and B. Golman, "Dead-Core Solutions to Simple Catalytic Reaction Problems in Chemical Engineering", *Eurasian Chem.-Technol. J.*, vol. 21, no. 1, pp. 29-33, Feb. 2019.