

Kirill Nikitin, Ph.D.

Software Developer / Computational Scientist

+7 905 775 96 90

nikitin.kira@gmail.com

dodo.inm.ras.ru/nikitin

linkedin.com/in/kirill-d-nikitin

Summary

Sep 2007 to current I am a computational scientist and a C/C++ software developer with 16 years experience in:

- Mathematical modeling and numerical methods in geosciences;
- Mesh generation, computational geometry;
- Computational fluid dynamics;
- Reservoir simulation.

Skills

Programming C, C++.

Experience Linux, HPC, ParaView, QtCreator, Git, SVN, LaTeX.

Languages Russian (native), English (advanced).

Experience

Dec 2010 to current **Junior Researcher → Researcher → Senior Researcher / Developer,**
Institute of Numerical Mathematics of Russian Academy of Sciences (INM RAS), Moscow, Russia.

I developed a nonlinear finite volume discretization scheme for convection-diffusion and two-phase flow numerical models (algorithms, methods, C++ code), prepared input data and scripts for testing, conducted both serial and parallel numerical tests, and prepared comprehensive reports. I actively participated in five INM RAS projects in collaboration with ExxonMobil URC (Houston, USA), which involved five business trips to the customer company.

I led research teams within three INM RAS projects with ExxonMobil URC (Houston, USA):

- Two-scale near-well correction method and flow modelling in fractured media,*
- Numerical solution of the black oil equations: discrete maximum principle and numerical well models,*
- Validation of robustness and accuracy of NTPFA discretization scheme of realistic complex grids and development of a stand-alone library for triplet information calculation.*

I developed the first version of the incompressible free surface flows simulator, that combines the projection method for solving the Navier-Stokes equations and the particle level set method for the free surface evolution on the adaptively refined octree meshes (C++ code with OpenMP), prepared the initial data for the simulation scenarios, ran tests, did the visualization of the results (GMV, Paraview, Houdini, POV-Ray) and supervised a Ph.D. student. Project URL: <http://dodo.inm.ras.ru/research/freesurface>.

I developed a software module in C++ for optimizing 2D sector models containing hydraulic fracturing based on adaptive moving mesh technology, took responsibility for preparing weekly and final reports, as well as maintaining regular communication with the customer company during my involvement in the INM RAS project with Gazpromneft (Saint Petersburg, Russia).

I developed an algorithm and a software module in C++ for the flow simulation of high-viscosity oils, taking into account thermal effects, prepared the report and communicated with the customer company within INM RAS project with Rosneft/UfaNIPIneft (Ufa, Russia).

I led and successfully completed six research projects as a **Principal Investigator**:

- 2018-2021 — *New numerical models and methods for solving the multi-physical problems of effective oil and gas recovery and safe disposal of radioactive waste* (Russian Science Foundation grant).
- 2017-2018 — *The numerical scheme of increased accuracy for the wells modelling in the oil recovery problems* (Russian President grant).
- 2015-2016 — *Development of computational technologies for radioactive waste geological disposal safety assessment* (Russian Foundation for Basic Research project).
- 2013-2014 — *Development of the new generation finite volume schemes for oil recovery problems and radionuclides disposal safety* (Russian President grant).
- 2012-2013 — *Monotone discretization scheme for flow and transport in porous media* (Russian Foundation for Basic Research project).
- 2011-2013 — *Predictive 3D modelling of catastrophic flooding, avalanches, landslides and mudflows* (Federal Target Program “Scientific and Scientific-Pedagogical Personnel of the Innovative Russia” contract).

I wrote 32 **publications**, h-index: 9 (Scopus ID 25924498000).

I delivered **presentations** at 35+ international and 15+ Russian conferences and workshops. Additionally, I represented Russia at the APEC Young Scientists Workshop on Effective Science Communication in the 21st Century (Kuala Lumpur-2015).

Mar 2014 **Developer / Researcher**, *Nuclear Safety Institute RAS, Moscow, Russia.*

Jan 2020 I participated in the development of the GeRa hydrogeological code, used for the assessment of radioactive waste deposit facilities' safety (C++ code with Qt interface). I implemented the nonlinear monotone finite volume scheme for the flow, advection-diffusion and Richards equations, developed a comprehensive two-phase gas-water flow and transport model, conducted code parallelization and benchmarking for enhanced performance, approbated the two-phase flow model on a real deep disposal facility.

Jul 2022 **Docent**, *Sirius University, Sirius / Sochi, Russia.*

Jun 2023 I guided the development of a two-phase flow model for fractured media in the Digital Rock Physics research project and supervised one master's student.

Sep 2017 **Assistant**, *Lomonosov Moscow State University, Moscow, Russia.*

Jun 2021 I conducted two practical courses for students at the Faculty of Computational Mathematics and Cybernetics:

- *Modern Computing Technologies,*
- *Computer Science Practicum.*

Awards I won the Medal of the Russian Academy of Sciences with a prize for young scientists in 2011.

Education

2007-2010 **Ph.D. in Mathematical Modeling, Numerical Methods and Software Systems**, *Institute of Numerical Mathematics of the Russian Academy of Sciences, Moscow, Russia.*

2002-2007 **M.S. in Applied Mathematics**, *Lomonosov Moscow State University, Russia.* GPA 4.9/5.0. Department of Mechanics and Mathematics, Chair of Computational Mathematics.