Kirill Nikitin, Ph.D.

Computational Scientist / Software Developer

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Summary

Sep 2007 to current

I am a computational scientist and a 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++, Fortran77 (basic).

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

Languages Russian (native), English (fluent).

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 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 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, ran serial and parallel numerical tests, prepared the reports and did 5 business trips to the customer company within 2 INM RAS projects with ExxonMobil URC (Houston, USA).

I supervised 2 other 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.*

I developed a software module for optimizing 2D sector models containing hydraulic fracturing and auto hydraulic-fracturing based on adaptive moving mesh technology (C++ code), prepared the weekly and final reports, communicated with the customer company within INM RAS project with Gazpromneft (Saint Petersburg, Russia).

I developed an algorithm and a software module (C++ code) 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 was a **Principal Investigator** in 6 projects:

- 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 was a reviewer for Journal of Computational Physics, Computational Geosciences, Russian Journal of Numerical Analysis and Mathematical Modelling.

I had **presentations** on 35+ international and 15+ Russian conferences and workshops, including: SIAM Geosciences (Padova-2013, Stanford-2015, Erlangen-2017, Houston-2019), ECMOR (Biarritz-2012, Catania-2014, Amsterdam-2016), USNCCM (San Diego-2015, Austin-2019), FVCA (Praha-2011, Berlin-2014, Lille-2017, Bergen/online-2020), WCCM (Barcelona-2012, Sao Paolo-2014), MIT EMI Conference (Boston-2018). I also was a **Russia representative** on APEC Young Scientist Workshop on Effective Science Communication in the 21st Century (Kuala-Lumpur-2015).

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

Jun 2021 | I was conducting two practical courses with students of the Faculty of Computational Mathematics and Cybernetics:
- *Modern computing technologies*,
- *Computer science practicum*.

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

Jan 2020 | I was a member of development team 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 the two-phase gas-water flow and transport model, did the code parallelization, performed the benchmarking.

July 2022 | **Docent**, *Sirius University, Sirius / Sochi, Russia*.

current | I am a member of the Digital Rock Physics research project team and a supervisor for one master's student.

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.