

# Chaplygin Andrei

Software developer

## PERSONAL DETAILS

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<i>Address</i>	Moscow, Russia
<i>Phone</i>	+79651818175
<i>Email</i>	achaplygin99@gmail.com
<i>Github</i>	<a href="https://github.com/Andrcraft9">https://github.com/Andrcraft9</a>
<i>LinkedIn</i>	<a href="https://www.linkedin.com/in/andrey-chaplygin-1917a4193/">https://www.linkedin.com/in/andrey-chaplygin-1917a4193/</a>

## WORK EXPERIENCE

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### Rock Flow Dynamics

2019-present

*Senior C++ Developer*

tNavigator - high-performance tool for integrated static and dynamic modelling from reservoir to surface networks.

### Faculty of Space Research, Lomonosov Moscow State University

2019

*C++ Developer*

Developing the software for autonomous satellite navigation. Software allows to estimate maximum permissible errors for measurements of satellite devices. Working with non-linear least square optimization problem.

### Schlumberger

2016-2019

*Researcher*

- We simulated multiphase incompressible/compressible flow in cylindrical tube using Open-Foam and compared different numerical schemes and algorithms.
- We developed the simulator FastRadialHF for the initiation and propagation hydraulic fractures. A model of high injection rate hydraulic fractures driven by wellbore pressure pulse was developed. An efficient nonlinear solver was implemented for the fully coupled multiphysics matrix. The influence of wellbore energy source parameters on fracture characteristics was studied.

### Geometric Modeling and Interactive Systems Research Group

2015-2016

*C++ Developer*

Developing the software for visualization of navigation satellite groups motion. Software allows to observe the simulated work of the GLONASS system, where orbital satellite groups and ground stations were displayed using computer graphics and modern methods of mathematical modeling.

## RESEARCH EXPERIENCE

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### PhD.

2019-present

*Marchuk Institute of Numerical Mathematics*

**Thesis: Improvement of the general ocean circulation model for efficient use on massively parallel and heterogeneous computing systems.**

### MSc.

2017-2019

*Lomonosov Moscow State University*

Faculty of Computational Mathematics and Cybernetics, Department of Computational Technologies and Modeling.

**Thesis: Load balancing method using Hilbert space-filling curves for INMOM (Institute of Numerical Mathematics Ocean Model)**

**BSc.**

**2013-2017**

*Lomonosov Moscow State University*

Faculty of Computational Mathematics and Cybernetics, Department of Computational Technologies and Modeling.

**Thesis: Implementation of parallel INMOM (Institute of Numerical Mathematics Ocean Model) ocean circulation model**

## SKILLS

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*Programming Languages*

C++, C, FORTRAN, PYTHON, WOLFRAM MATHEMATICA

*Parallel Computing*

MPI, OPENMP, CUDA

*Computer Graphics*

OPENSCENEGAPH, OPENGL

*Other*

GIT, L<sup>A</sup>T<sub>E</sub>X, QT, PETSC, GSL, OPENFOAM, LAPACK/BLAS

## PUBLICATIONS

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Chaplygin, A. V., Gusev, A. V., Diansky, N. A.

High-performance Shallow Water Model for Use on Massively Parallel and Heterogeneous Computing Systems. *Supercomputing Frontiers and Innovations*, 8(4), 2022

Fomin, V. V., Panasenкова, I. I., Gusev A. V., Chaplygin, A. V., Diansky, N. A.

Operational forecasting system for Arctic Ocean using the Russian marine circulation model INMOM-Arctic. *Arctic: Ecology and Economy*, vol. 11, no. 2, 2021

Chaplygin, A.V., Gusev, A.V.

Shallow Water Model Using a Hybrid MPI/OpenMP Parallel Programming. *Problems of Informatics* 1, 2021

Maxim Chertov, Andrey Chaplygin.

Evaluating characteristics of high-rate hydraulic fractures driven by wellbore energy source. *Engineering Fracture Mechanics*, Volume 222, 2019

Chaplygin A.V., Diansky N.A., and Gusev A.V.

Load balancing using Hilbert space-filling curves for parallel shallow water simulations. *Numerical methods and programming*. Vol.20, 2019.

Diansky N.A, Fomin V.V., Grigoriev A.V., Chaplygin A.V., Zatsepin A.G.

Spatial-Temporal Variability of Inertial Currents in the Eastern Part of the Black Sea in a Storm Period. *Physical Oceanography*. Vol.26, Iss.2, 2019.

## **PRESENTATIONS**

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Chaplygin A.V., Diansky N.A., and Gusev A.V.

Parallel modeling of nonlinear shallow water equations. *60th MIPT Scientific Conference, 2017.*

Anatoly Gusev, Andrey Chaplygin, Nikolay Diansky.

A full free surface ocean general circulation model in sigma-coordinates for simulation of the World Ocean circulation and its variability. *EGU General Assembly 2019*

Fomin V.V., Diansky N.A., Chaplygin A.V.

Calculation of extreme surge in the Taganrog Bay and the use of atmospheric and ocean circulation models of different spatial resolution. *International Scientific Conference Marine Research and Education 2017.*

## **ACTIVITIES**

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- Rome-Moscow school of Matrix Methods and Applied Linear Algebra 2018.
- Rome-Moscow school of Matrix Methods and Applied Linear Algebra 2016.