Curriculum Vitae for Diako Darian

Personal information

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Born:	24.08.1985	Nationality:	Norwegian

Summary

I hold a MSc. in Theoretical Physics and I have submitted my Ph.D. in Computational Fluid Mechanics. As a student at both Physics and Mathematics institutes at the University of Oslo, I have acquired a broad knowledge in various physical, mathematical and numerical methods, as well as data science. Within my Ph.D. period I have had the opportunity to work both alone and in team with other researchers from both Norway and several other international universities. In addition, I have had two international research stays (six months in total) at the Kobe University, Japan. The core of my doctoral research was related to the development of high performance numerical codes, utilizing both low level (C/C++) and high level (Python/Cython) languages, to study plasma-object interactions and ionospheric instabilities and turbulence. An important part of my research has been the validation of existing and new mathematical models of plasma-object interactions by means of numerical simulations and comparison with experimental measurements.

Technical skills

Frameworks	FEniCS, STL, Boost, MPI, PETSc, NumPy, SciPy, Matplotlib
Languages	C, C++, Fortran, Java, Python, Cython, Matlab, Mathematica, Bash, Julia, Rust
Tools	Jupyter Notebook, LaTex, Git, GCC, CMake, Linux, OpenFoam, ParaView

Education

2014 - 2018	Ph.D. in Mechanics, Department of Mathematics, University of Oslo. Thesis title 'Plasma-object interactions'.

2008 - 2010	MSc. in Theoretical Physics, Department of Physics, University of Oslo
2005 - 2008	BSc. in Physics, Department of Physics, University of Oslo

Professional experience

2019 –	Consultant at Expert Analytics
2014 – 2018	Ph.D. Research Fellow, Department of Mathematics, University of Oslo. Including 25% assistant teacher in Calculus, Field Theory and Continuum Mechanics.
2006 – 2010	Student mentor to motivate teenagers to choose scientific higher education by offering training in Mathematics and Physics, ENT3R, Faculty of Mathematics and Natural Sciences, University of Oslo.

Languages

English	Fluent
Kurdish	Fluent
Norwegian	Fluent
Persian	Fluent
Turkish	Fluent

Personal skills

Communication	As a result of my Ph.D. research in a multidisciplinary research environment, and teaching duties at the University of Oslo, I have a lot of training in writing and presenting complex methods and technical details to a wide spectrum of audiences with different backgrounds.
Development	I have been involved in developing both high performance codes and writing scripts for data analysis and visualization for both large and small projects. My Ph.D. research reflects my ability to work alone and in teams with people with different background and education.
Management	Through my work with different projects and people I have gained experience in how to design, develop and manage both small and large projects.
Physics, Mathematics, and Programming	With a broad background from different fields within Physics and Mathematics, I have developed the necessary analytical skills and mindset for approaching complex phenomena and problems. Developing new numerical codes, and generating and analyzing large scale simulation data to validate existing and new mathematical models have been a core component of my research.

Some interests and hobbies

Academic	Scientific Computing, Hydrodynamics, Magnetohydrodynamics, Space and Plasma Physics, Cosmology, Geometric Algebra
Other	Powerlifting, Skiing, Hiking, Running

Extended descriptions of selected projects

Activity	Implementation of generic velocity distribution functions for modeling of plasmas.
Period	2018 (October-December)
Role	Lead developer and manager
Staffing	2
Volume	80% - 100%
Description	This was my final project as a Ph.D. student. During this project, I extended the Orbital-motion-limited (OML) theory, which describes plasma-object interactions, to non-Maxwellian plasmas. To validate the theory, I had to add a generic functionality to PUNC++ (described below) for handling plasma particles with arbitrary velocity distribution functions. A very good agreement between the theory and numerical simulations with PUNC++ was achieved.
Tools	C++, CMake, GCC, FEniCS, PUNC++, ParaView

Activity	PUNC++ - Particle-in-Unstructured-Cell written in C++
Period	July 2017 - October 2018
Role	Lead developer and co-leader of the project
Staffing	4
Volume	100%
Description	In order to be able to run large scale simulations of plasma-object interactions, a high performance programming code is an absolute necessity. For this reason C++ was chosen as the main programming language for this project. PUNC++ is capable of simulating multiple electrically conducting objects with arbitrary geometries, both floating and connected to other objects in arbitrary circuits. Several finite element solvers with different order of accuracy are also implemented, which can be chosen by the user depending on the desired computational accuracy and efficiency.
Tools	C++, CMake, GCC, FEniCS

Activity	PUNC - Particle-in-Unstructured-Cell
Period	2016 (September-December)
Role	Co-leader and co-developer of the project
Staffing	4
Volume	100%

Description	The main goal of this project was a rapid prototyping of a new model for handling conducting objects with complex geometries in plasmas using the particle-in-cell method within the framework of FEniCS.
Tools	Python, FEniCS

Activity	Implementation of magnetohydrodynamics equations in SpectralDNS
Period	2015 (January-December)
Role	Lead developer
Staffing	2
Volume	100%
Description	SpectralDNS is a high-performance pseudo-spectral Navier-Stokes DNS solver developed by Mikael Mortensen. My contribution to this project is the implementation of magnetohydrodynamics solvers to study plasma instabilities and turbulence in the ionosphere.
Tools	Python, Cython, ParaView