TOON WEYENS

AIX-EN-PROVENCE, FRANCE · +32 494 39 92 19 · WEYENST@GMAIL.COM

Through my background in general energy engineering, as well as my Ph.D. specialized in nuclear fusion science, I am well suited to tackle any problem where analytical insight and higher mathematics is necessary, without losing sight of the big picture. This is backed up by extensive computational physics knowledge. As working in a dynamic multicultural and multilingual environment challenges and motivates me, I am always looking for new opportunities to learn. Furthermore, I enjoy sports, music, traveling, mathematics and reading.

nationality: Belgian
date of birth: 30/12/1987

EXPERIENCE

Jan 13 - Now **Postdoctoral Monaco Fellow**

ITER Organization

The numerical code PB3D, developed as part of my Ph.D. project is put to use at the ITER project to support the development of next-generation toroidal magnetic fusion devices. Have a look at the PB3D project below.

Jan 12 - Dec 16 **Doctoral Researcher**

Universidad Carlos III de Madrid · Eindhoven University of Technology · ITER Organization

My Ph.D. research project involved furthering the understanding of an important class of instabilities that occur in toroidal magnetic confinement devices for nuclear fusion, called *high-n* instabilities. A dedicated mathematical theory was developed [Weyens et al, 2014, P.o.P, 21, 4] and a high-performance numerical code designed, PB3D [Weyens et al, 2017, J.c.P, 330], in modern Fortran, making use of the MPI protocol for parallelization. Part of the work was done at the ITER Organization, a multi-billion dolar project where world's most advanced nuclear fusion research reactor is being built.

EDUCATION

Sep 10 - Aug 12 **Master of Science - Nuclear Fusion Science & Technology**

Ghent University · Universidad Carlos III de Madrid · Université de Lorraine

European program in the Erasmus Mundus framework.

Graduated top 5%.

Sep 08 - Aug 10 **Master of Science - Energy Engineering**

University of Leuven · Technische Universität Berlin (exchange)

Curriculum included mostly scientific but also economic and managerial aspects of energy.

Graduated top 15%.

May 18 **Online Specialization - Deep Learning**

Coursera

The topics include the foundations of Deep Learning, understand how to build neural networks, and learn how to lead successful machine learning projects. Neural network techniques such as convolutional networks, RNNs, LSTM, Adam, Dropout, BatchNorm, Xavier/He initialization, and more are treated. There is a focus on case studies from healthcare, autonomous driving, sign language reading, music generation, and natural language processing. These ideas are practiced in Python, and use is made of software packages TensorFlow as well as Keras.

workload: 60-100 hours

certificate: link

May 14 **Summer School - 23rd Summer School on Parallel Computing**

CINECA, Casalecchio Di Reno

The Summer School on Parallel Computing is an intense, 10 day, graduate level course in HPC, with the objective of providing the participants with the skills to program and exploit modern parallel computing systems to solve computational problems. The school covers key topics focusing on HPC lexicon, parallel architectures, parallel programming models and methods, software engineering, profilers and debuggers.

workload: 100 hours

SKILLS

Languages

English	★★★★★
Dutch	★★★★★
Spanish	★★★★★
French	★★★★★
German	★★★★★
Portuguese	★★★★★
Italian	★★★★★

Computer

- **Linux** · daily and much-preferred operating system
- **vim** · daily and much-preferred editor
- **LaTeX** · preferred tool for documents
- **html, CSS** · used for this curriculum vitae (with markdown → Pandoc)
- **git** · for version control of virtually all my documents and projects
- **ParaView, VisIt** · favorite 3-D visualization tools, combined with HDF5 and XDMF
- **HDF5 with XDMF** · best data model, both for storage and for visualization

Programming

- **Python** · preferred for most applications
- **Fortran** · used for hpc application such as PB3D, lots of experience
- **MPI, OpenMP** · parallelization for HPC, most experience with MPI
- **Bash, Make, ...** · used daily for scripting and development
- **LaTeX, LuaTeX** · preferred for large documents, such as my Ph.D. dissertation, lots of experience

Other

- **Fusion DC** 2016 Program Representative
- **TGD Solutions** board member

RESEARCH

Jan 13 - now **PB3D**

Peeling-Ballooning in 3-D

PB3D (**P**eeling-**B**allooning in **3**-**D**} is a numerical code developed during as part of my doctoral research project. It is capable of analyzing in an efficient manner the peeling-ballooning stability of toroidal magnetic confinement devices for nuclear fusion. These so-called high-n instabilities are of importance in thee next generation of devices as they are easily excited and have the potential to couple plasma from the hot interior to the cold reactor walls. PB3D is unique in that it is geared towards these high-n instabilities, in general 3-D configurations, while allowing for the plasma edge to be perturbed [Weyens et al, 2017, J.c.P, 330].

For my postdoctoral research I currently emply PB3D to investigate certain 3-D effects, such as the usage of resonant magnetic perturbations for ELM control--an important class of periodic instabilities that degradate confinement, with applications to ITER.

The PB3D code is freely available and well-documented.

website: PB3D.github.io

source: github

AWARDS

2017 **Ph.D. Research Award**

European Physical Society

The Award The Plasma Physics Division of the European Physical Society (EPS) shall grant up to four prizes annually to young scientists from the 38 European countries associated with the EPS in recognition of truly outstanding research achievements associated with their PhD study in the broad field of plasma physics.

website: EPS

REFERENCES

Dr. Alberto Loarte

Science Division head at ITER Organization · scientific officer at the European Commission

alberto.loarte@iter.org

+33 4 42 176508

Prof. Dr. Guido Huijsmans

full professor at Eindhoven University of Technology · scientific officer at the European Commission

guido.huijsmans@cea.fr

+33 4 42 256152

Prof. Dr. Raul Sánchez

full professor at Universidad Carlos III de Madrid

rsanchez@fis.uc3m.es

+34 91 6246001

Aix-en-Provence, France · +32 494 39 92 19 · weyenst@gmail.com