Dr. Bernat Font

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Research interests

Computational fluid dynamics, turbulence modelling, numerical methods, deep learning & data-driven models, high-performance computing.

Experience

Postdoctoral Researcher, Large-scale Computational Fluid Dynamics Group, Barcelona Supercomputing Center, Spain. 2021-
Topic: NextSim EU project - Next generation of industrial aerodynamic simulation code.

Postdoctoral Researcher, Mathematical Institute, Oxford University, UK. 2020-2021
Topic: Transport of porous particles in fluid flow.

Visiting Researcher, Institute of High-Performance Computing, A*STAR, Singapore. 2017-2020
Doctoral Researcher, University of Southampton, UK. 2015-2020

Education

Ph.D. Computational Fluid Dynamics, University of Southampton, UK. 2015-2020
Thesis: Modelling of Flow Past Long Cylindrical Structures. [Download]
Supervisors: A. Prof. G.D. Weymouth, Prof. O.R. Tutty, Dr. V.-T. Nguyen.
Visiting Researcher: Research attachment funded by the ARAP mobility scheme, Institute of High-Performance Computing, A*STAR, Singapore.

M.Sc. Computational Fluid Dynamics, Cranfield University, UK. 2014-2015
Thesis: High-order Shock-capturing Schemes for Micro Shock Tubes. [Download]
Supervisor: Dr. L. Könözsy.
Double Degree with Ingeniería Superior in Aeronautical Engineering.

Ingeniería Superior Aeronautical Engineering, Universitat Politècnica de Catalunya, Spain. 2012-2015
Mentor: Prof. C.-D. Pérez-Segarra.
Equivalent to Master of Engineering.

Ingeniería Técnica Aeronautical Engineering, Universitat Politècnica de Catalunya, Spain. 2009-2012
Equivalent to Bachelor of Engineering.

Publications

Peer-reviewed journal articles

[2] Font, B., Weymouth, G.D., Nguyen, V.-T. & Tutty, O.R. 2021 Deep-learning of the spanwise-averaged Navier–Stokes equations. *Journal of Computational Physics* 434, 110199. [DOI] [arXiv]

[1] Font, B., Weymouth, G.D., Nguyen, V.-T. & Tutty, O.R. 2019 Span effect on the turbulence nature of flow past a circular cylinder. *Journal of Fluid Mechanics* 878, 306–323. [DOI] [arXiv]

Peer-reviewed symposium proceedings

[1] Font, B., Weymouth, G.D., Nguyen, V.-T. & Tutty, O.R. 2020 Turbulent wake prediction using deep convolutional neural networks *33rd Symposium on Naval Hydrodynamics*, Osaka, Japan. [URL]

Conference proceedings

[1] Font, B., Weymouth, G.D. & Tutty, O.R. 2017 Analysis of two-dimensional and three-dimensional wakes of long circular cylinders. *OCEANS MTS/IEEE*, Aberdeen, UK. [DOI]

Published abstracts

[3] Font, B., Weymouth, G.D. & Tutty, O.R. 2019 Deep learning the spanwise-averaged wake of a circular cylinder. *72nd Meeting of the APS Division of Fluid Dynamics*, Seattle, US. [Abstract] [Presentation]

[2] Font, B., Castells, I., Weymouth, G.D., Nguyen, V.-T. & Tutty, O.R. 2019 Turbulence dynamics transition of flow past a circular cylinder and the prediction of vortex-induced forces. *European Turbulence Conference 17*, Torino, Italy. [Abstract]

[1] Font, B., Weymouth, G.D. & Tutty, O.R. 2016 A two-dimensional model for three-dimensional symmetric flows. *UK Fluids Conference*, London, UK. [Abstract]

Invited Talks

2021 June, Engineering Mind Podcast.
2021 April, Applied Mathematics in Aerospace Engineering seminar, Universidad Politecnica de Madrid, Spain.
2021 March, Applied Math Colloquium, University North Carolina, US.
2021 February, Ocean Engineering, University Rhode Island, US.
2020 November, Fluid Dynamics Group at the Institute of High Performance Computing (A*STAR), Singapore.
2020 July, Fluid Structure Interactions Group Seminar series, University of Southampton, UK.
2017 May, Fluid Structure Interactions Group Seminar series, University of Southampton, UK.

Funded Research

University of Southampton FEE Education Hub PhD grant (2015). GBP 28,353
A*STAR ARAP Research Mobility Programme grant (2015). SGD 74,500

Teaching and supervision

Supervisor of MSc projects, University of Southampton. 2019-
Machine Learning Wall Model for Bluff Bodies Forces Calculation.
Accurate Flow Interpolation using Optimal Transport Theory.

Demonstrator, University of Southampton. 2015-2017
Aerodynamics: Nozzle lab.
Propulsion: Ramjet, turbojet and rocket engine labs.
Aerothermodynamics: Marking of lab reports.

Private tutor. 2011-2014
Mathematics, physics and programming tutor to High School and Undergraduate students.

Software skills

Programming languages: Fortran (including MPI), Python (including Keras and Tensorflow), C, Java, Matlab.

Tools: Git, LaTeX, Inkscape.

Others: MySQL, HTML, Qt.

References

Gabriel D. Weymouth, Associate Professor, Fluid and Structure Interactions Group.
University of Southampton, UK.
g.d.weymouth@soton.ac.uk

Carles-David Pérez-Segarra, Professor, Heat and Mass Transfer Technological Center.
Universitat Politècnica de Catalunya, Spain.
segarra@cttc-upc.net

Vinh-Tan Nguyen, Senior Scientist, Institute of High Performance Computing.
A*STAR, Singapore.
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F. Xavier Trias, Associate Professor, Heat and Mass Transfer Technological Center.
Universitat Politècnica de Catalunya, Spain.
xavi@cttc.upc.edu

Owen R. Tutty, Professor, Aerodynamics and Flight Mechanics Group.
University of Southampton, UK.
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