UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Doctoral School

DOCTORAL STUDENT ACTIVITY REPORT (doctoral candidates under RD 99/2011)

Document generation date: 15/11/24

Study start date: 30/09/21

Maximum finish date: 30/09/25

Details of the doctoral student

First name and surnames: Marc Ollé Bernades

Doctoral programme: DOCTORAT EN ENGINYERIA MECÀNICA, FLUIDS I AERONÀUTICA

Title of the thesis:

Details of the thesis supervisor

First name and surnames: Lluís Jofre Cruanyes

Details of the thesis co-supervisor (if applicable)

First name and surnames: Francesco Capuano

Details of the tutor (if applicable)

First name and surnames: Salvador De Las Heras Jimenez

Doctoral programme coordinator

First name and surnames: Jasmina Casals Terre

Activities

Stays at other universities or research centres or resulting from an agreement (co-supervisor, mobility, Erasmus Mundus, etc.)

Name of the university or research centre: Center for Turbulence Research, Stanford University (University)

City and country: Stanford, United States of America

Aim of the stay: Research, Center for Turbulence Research - International mobility mention - Flow physics characterization of microconfined high-pressure transcritical fluids turbulence - Investigation of a novel numerical scheme for high-pressure supercritical fluids turbulence

Start date: 17/07/2022

End date: 12/08/2022

Duration: 27 days

Name of the university or research centre: Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique (Technology centre)

City and country: Toulouse

Aim of the stay: Research, Research stay of +5months for international mobility mention - Non-dissipative large-eddy simulation of wall-bounded transcritical turbulent flows

Start date: 27/11/2023

End date: 07/05/2024

Duration: 5 months, 11 days

Presentations at conferences

Authors: Bernades, M.; Capuano, F.; Jofre, L.

Title of the presentation: Direct numerical simulation of wall-bounded turbulence at high-pressure transcritical conditions

Name of the conference: International Seminar on Non-Ideal Compressible Fluid Dynamics

Format (poster/oral communication): Conference

City and country: London, United Kingdom (2022)

Date: 03/11/2022

Authors: Bernades, M.; Capuano, F.; Trias, F. X.; Jofre, L.

Title of the presentation: Energy-preserving stable computations of high-pressure supercritical fluids turbulence

Name of the conference: European Congress on Computational Methods in Applied Sciences and Engineering

Format (poster/oral communication): Conference

City and country: Oslo, Norway (2022)

Date: 09/06/2022

Authors: Bernades, M.; Capuano, F.; Jofre, L.

Title of the presentation: On the stability of wall-bounded flows at high-pressure transcritical fluid conditions

Name of the conference: Spanish Fluid Mechanics Conference

Format (poster/oral communication): Conference

City and country: Barcelona, Espanya (2023)

Date: 05/07/2023

Authors: Masclans, N.; Vázquez, F.; Bernades, M.; Badia, R.M.; Jofre, L.

Title of the presentation: Machine learning-based recovery of thermophysical information from velocity data in supercritical fluids turbulence

Name of the conference: International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements

Format (poster/oral communication): Conference

City and country: Barcelona, Espanya (2023)

Date: 07/09/2023

Authors: Bernades, M.; Jofre, L.; Capuano, F.

Title of the presentation: Non-dissipative large-eddy simulation of high-pressure transcritical turbulent flows: formulation and a priori analysis

Name of the conference: International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements

Format (poster/oral communication): Conference

City and country: Barcelona, Espanya (2023)

Date: 07/09/2023

Authors: Bernades, M.; Capuano, F.; Jofre, L.

Title of the presentation: Linear stability exploration of transcritical non-isothermal Poiseuille flows

Name of the conference: European Congress on Computational Methods in Applied Sciences and Engineering

Format (poster/oral communication): Conference

City and country: Lisboa, Portugal (2024)

Date:

Participation in research projects

Competitive project (Yes or No): Yes

Title and code of the project: Turbulence-On-a-Chip: Supercritically Overcoming the Energy Frontier in Microfluidics., 729 (E-01704)

Funding body: European Research Council (ERC)

Main researcher: Jofre Cruanyes, Lluís

Start and end date of the project: 01/04/2022 - 31/03/2027

Start and end date of the participation: 2022-04-01 - 2027-03-31

Articles published in indexed journals

Complete reference for the article: Bernades, M.; Jofre, L., Thermophysical analysis of microconfined turbulent flow regimes at supercritical fluid conditions in heat transfer applications, Journal of heat transfer, 12/08/2022, 144, 8, 082501, 0022-1481

Impact factor: 1.855

Complete reference for the article: Bernades, M.; Capuano, F.; Jofre, L., Microconfined high-pressure transcritical fluid turbulence, Physics of fluids, 30/01/2023, 35, 1, article 015163, 1070-6631

Impact factor: 4.98

Complete reference for the article: Jofre, L.; Bernades, M.; Capuano, F., Dimensionality reduction of non-buoyant microconfined high-pressure transcritical fluid turbulence, International journal of heat and fluid flow, 02/06/2023, 102, article 109169, 0142-727X

Impact factor: 2.643

Complete reference for the article: Masclans, N.; Vázquez, F.; Bernades, M.; Badia, R.M.; Jofre, L., Thermodynamics-informed neural network for recovering supercritical fluid thermophysical information from turbulent velocity data, Elsevier, International journal of thermofluids, 11/2023, 20, article 100448, 2666-2027

Impact factor: 1.334

Complete reference for the article: Bernades, M.; Jofre, L.; Capuano, F., Kinetic-energy- and pressure-equilibrium-preserving schemes for real-gas turbulence in the transcritical regime, Journal of computational physics, 15/11/2023, 493, article 112477, 0021-9991

Impact factor: 7.1

Complete reference for the article: Bernades, M.; Jofre, L.; Capuano, F., A priori analysis for high-fidelity large-eddy simulation of wall-bounded transcritical turbulent flows, The Journal of supercritical fluids, 31/05/2024, 207, 106191, 0896-8446

Impact factor: 8.3

Complete reference for the article: Abdellatif, A.; Bandarrinha, C.; Bernades, M.; Jofre, L., Microconfined high-pressure transcritical channel flow database: laminar, transitional & turbulent regimes, Nature, Scientific data, 23/08/2024, 11, article 916, 2052-4463

Impact factor: 5.8

Other publications

Complete reference for the publication: Bernades, M.; Capuano, F.; Maeda, K.; Jofre, L. 2022. *Flow physics characterization of microconfined high-pressure transcritical fluids turbulence*. 10 pages.

Complete reference for the publication: Bernades, M.; Jofre, L.; Capuano, F. 2022. *Investigation of a novel numerical scheme for high-pressure supercritical fluids turbulence*. 10 pages.

Other activities

Description: *Estada de recerca*. 17/07/2022.

Description: *Estada de recerca*. 27/11/2023.