

Alessandro Tassone

Assistant Professor/CFD Analyst

About Me Post-doctoral researcher with a significant experience in the development of liquid metal systems and components for fusion reactors.

Experience

Aug 2022 - Present, Assistant Professor, Sapienza University of Rome

Post-doc 3-year tenure-track position. Main responsibilities:

- Teaching and mentoring at undergraduate (MEng) and graduate (PhD) level
 - Main teacher
 - 2024 – present: Fusion Reactor Technology, 6 ETCS
 - 2022 – present: Liquid Metal Magnetohydrodynamics, 3 ETCS
 - 2021 – present: Engineering Thermofluids, 6 ETCS
 - Adjunct teacher
 - 2024 – present: Practical CFD: A Step-by-Step Guide to Computational Fluid Dynamics with OpenFOAM, 3 ETCS
 - 2020 – 2023: Technology and Physics of Fusion Energy, Technology module, 3/6 ETCS
 - 2017 – 2019: Simulazione Numerica dei Sistemi Nucleari (Numerical Simulation of Nuclear Systems and Components), CFD module, 1.5/3 ECTS
- Scientific responsible person for experimental characterization of tritium permeation barriers in TITANS, Horizon Europe project
- Spokesperson of the Magnetohydrodynamics and CFD team in the Nuclear Engineering Research Group (NERG)

Dec 2019 - Jul 2022, Research Fellow, Sapienza University of Rome

Post-doc. Main responsibilities:

- Teaching and mentoring at undergraduate (MEng) and graduate (PhD) level
- Analyst for computational fluid-dynamic (CFD) simulations
 - Computational magnetohydrodynamics (MHD) for liquid metal flows
 - Turbulent heat transfer for low-Pr fluids
 - Fusion-reactor breeding blanket thermal-hydraulics
- Code development for CFD and system thermal-hydraulic codes
- Design of liquid metal blankets for nuclear fusion applications

Jun 2018 - May 2021, EUROfusion Engineering Grantee, Sapienza University of Rome

Main responsibilities:

- Development of numerical models and codes for computational magnetohydrodynamics (liquid metal)
- Participation in experimental campaigns to collect data for Verification & Validation
- Visiting scholar at Karlsruhe Institute of Technology, 3.5 months



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Education

Nov 2015 - Feb 2019, Sapienza University of Rome

PhD in Energy and Environment. *Study on liquid metal magnetohydrodynamic flows and numerical application to a water-cooled blanket for fusion reactors*, dissertation defended 11/02/2019 with grade excellent

Jan 2013 - Oct 2015, Sapienza University of Rome

MEng in Nuclear and Energy Engineering. *Computational fluid-dynamics simulation of the MHD flow in the Water-Cooled Lithium Lead breeding blanket module*, thesis defended 28/10/2015 with grade 110/110

Sep 2008 - Dec 2012, Sapienza University of Rome

BEng in Energy Engineering

Software Skills

Programming languages

Proficient

- Perl, LaTeX

Intermediate

- C++

Basic

- Python, Matlab, VBA

CFD codes

Proficient

- CFX

Intermediate

- OpenFOAM

Basic

- Fluent

Others

- ANSYS Workbench, Windows OS, Linux OS, Microsoft Office

Long-time user (since 2015) of ANSYS Workbench suite and CFX. Intermediate level user of OpenFOAM (since 2016) and some experience in basic programming. Knowledge of Perl for data post-processing and visualization and C++ for OpenFOAM development. Basic familiarity with Python, Matlab, VBA for automation of small tasks.

Communication Skills

Language

	Reading	Writing	Listening	Speaking
Italian	Mother-tongue			
English	C2	C1	C1	C1
Greek	n.a.	n.a.		προσπαθώ

Organisational skills

Experience in supervising student work. Managerial and multi-tasking skills for coordination of small research groups. Familiarity with preparation of research proposals for national and international calls.

Interpersonal skills

Good workplace communication skills, familiarity with international working environment, 3+ year experience in organizing MEng and PhD level courses in English.



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Scientific production

Research interests

Liquid metal magnetohydrodynamics (MHD), fusion blanket engineering, computational fluid dynamics (CFD), heat and mass transfer, system thermal-hydraulic codes (SYS-TH), code development, nuclear fusion reactors, GEN-IV fission reactors, sodium fast reactors (SFR), lead fast reactors (LFR)

Author or co-author of 30+ papers published in indexed international journals and conference proceedings

Recent relevant publications, full list here.

- P. Arena, G. Bongiovì, I. Catanzaro, C. Ciurluini, A. Collaku, A. Del Nevo, P. A. Di Maio, M. D'Onorio, F. Giannetti, V. Imbriani, *et al.*, "Design and integration of the eu-demo water-cooled lead lithium breeding blanket," *Energies*, vol. 16, no. 4, p. 2069, 2023. doi: 10.3390/en16042069
- S. Siriano, F. R. Ugorri, A. Tassone, and G. Caruso, "3d mhd analysis of prototypical manifold for liquid metal blankets," *Nuclear Fusion*, vol. 63, no. 8, p. 086005, 2023. doi: 10.1088/1741-4326/acdc14
- C. Mistrangelo, L. Bühler, C. Alberghi, S. Bassini, L. Candido, C. Courtessole, A. Tassone, F. R. Ugorri, and O. Zikanov, "MHD R&D Activities for Liquid Metal Blankets," *Energies*, vol. 14, no. 20, p. 6640, 2021. doi: 10.3390/en14206640
- L. Melchiorri, V. Narcisi, F. Giannetti, G. Caruso, and A. Tassone, "Development of a RELAP5/MOD3. 3 Module for MHD Pressure Drop Analysis in Liquid Metals Loops: Verification and Validation," *Energies*, vol. 14, no. 17, p. 5538, 2021. doi: 10.3390/en14175538
- A. Tassone and G. Caruso, "Computational mhd analyses in support of the design of the wcll tbm breeding zone," *Fusion Engineering and Design*, vol. 170, p. 112535, 2021. doi: 10.1016/j.fusengdes.2021.112535
- S. Siriano, A. Tassone, and G. Caruso, "Numerical simulation of thin-film MHD flow for nonuniform conductivity walls," *Fusion Science and Technology*, pp. 1–15, 2021. In press, doi: 10.1080/15361055.2020.1858671
- S. Smolentsev, T. Rhodes, Y. Yan, A. Tassone, C. Mistrangelo, L. Bühler, and F. Ugorri, "Code-to-Code Comparison for a PbLi Mixed-Convection MHD Flow," *Fusion Science and Technology*, pp. 1–17, 2020. doi: 10.1080/15361055.2020.1751378

Scopus database

623 citations by 383 documents (26/01/2024), h-index: 12

Speaker at several International Conferences

Symposium On Fusion Technology (SOFT), International Symposium on Fusion Nuclear Technology (ISFNT), etc.

Reviewer for academic journals

Fusion Eng. Des., Nucl. Eng. Des., Nucl. Fusion, Fusion Sci. Tech., etc. Full list available here

Other

Topic editor and member of Topical Advisory Panel for the *Energies* journal.



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Grants and award

Grants awarded as principal investigator (PI):

EUROfusion Engineering Grant, EUROfusion Consortium, 3 years
MHD Analyses and Code Validation, 2018-2021, 200 k€

Start-up Research Grant, Sapienza University of Rome, 1 year

- Investigation on mixed convective magnetohydrodynamic flows for fusion reactor blanket design, 2017, 1k€
- Liquid metal MHD flows in water-cooled test blanket module for ITER, 2019, 2k€

Medium-size Research Grant, Sapienza University of Rome, 3 years
Extreme magnetoconvection in shallow horizontally heated cavities: direct numerical simulation and preliminary test section design, 2020-2023, 15 k€

Grants awarded as investigator:

EUROfusion "Bernard Bigot" Researcher Grant, EUROfusio Consortium, 2 years

Multiphase magnetohydrodynamic modelling of Helium transport, 2023-2025, 150 k€ (PI: Simone Siriano)

Large-size (50 k€), Medium-size (15 k€) and Small-size (5 k€) Research Grant, Sapienza University of Rome, 3 years

- Numerical simulation and assessment of subchannel capabilities of RELAP5 System Thermal-Hydraulic code, Large, 2022-2025 (PI: Gianfranco Caruso)
- Experimental evaluation of pool boiling heat transfer coefficient at high thermal flux for a passive decay heat removal system to be used in fission and fusion power plant, Medium, 2021-2024 (PI: Fabio Giannetti)
- Shock wave propagation in liquid metal with an applied static magnetic field, Small, 2020-2023 (PI: Gianfranco Caruso)
- Development and validation of a thermohydraulic transient model capable to analyze the TBM for ITER and the Breeding Blanket for the EU-DEMO reactor, 2019-2022 (PI: Fabio Giannetti)

European Research Projects, EURATOM

- EUROfusion FP9 Horizon Europe, 2022-2023, MHD Analyst for DEMO Central Team
- Tritium Impact and Transfer in Advanced Nuclear reactorS (TITANS), 2022-2025, Experimental assessment of tritium transport through Eurofer in water at fusion/fission-relevant operational conditions
- Proof of Augmented Safety Conditions in Advanced Liquid-metal-cooled systems (PASCAL), 2020-2024, CFD simulation in deformed fuel bundles for Lead Fast Reactors
- EUROfusion FP9 Horizon Europe, 2021-2027, Work Package Breeding Blanket and Test Blanket Module
- EUROfusion FP8 H2020, 2014-2020, Work Package Breeding Blanket and Project Management Interface