

PERSONAL INFORMATION **Jacopo Liberatori**

WORK EXPERIENCE

February 2024 – Present **Postdoctoral Researcher**

Sapienza University of Rome
Department of Mechanical and Aerospace Engineering
Topic: *Multi-fidelity and Robust Optimization for Aerospace Propulsion Systems.*

December 2023 – January 2024 **Independent Contractor Agreement (Lavoro Autonomo)**

Sapienza University of Rome
Department of Mechanical and Aerospace Engineering
Topic: *Development of modeling approaches addressing the evaporation of liquid fuels for space propulsion applications using the OpenFOAM toolbox.*
Scientific Manager: Prof. Mauro Valorani.

EDUCATION AND TRAINING

2020–2023 **Ph.D. in Aeronautics and Space Engineering**

Sapienza University of Rome
Thesis Title: *Toward Climate-Neutral Aviation: Uncertainty Quantification, Bayesian Inference, and Optimization supporting Multi-Fidelity CFD.*
Supervisors: Prof. Pietro Paolo Ciottoli, Prof. Mauro Valorani.

November 2020 – December 2020 **Training Course - "Fundamentals of Turbulent Combustion"**

Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique (CERFACS)

2018–2020 **Master's Degree in Mechanical Engineering**

Sapienza University of Rome
Final Grade: 110/110 cum Laude.
Thesis Title: *Numerical Analysis of a Double Swirl Burner under Isothermal Conditions.*
Supervisor: Prof. Pietro Paolo Ciottoli.

2015–2018 **Bachelor's Degree in Mechanical Engineering**

Sapienza University of Rome
Final Grade: 110/110.
Thesis Title: *Metodi di Raccolta e Analisi di Dati per la Gestione degli Impianti a Fonti Rinnovabili.*
Supervisor: Prof. Alessandro Corsini.

2010–2015 **High School Diploma (scientific studies)**

Collegio San Giuseppe - Istituto De Merode, Rome
Final Grade: 100/100 cum Laude.

DIGITAL SKILLS

Programming languages Python, C++, MATLAB, Fortran, Wolfram, Julia.

CFD softwares OpenFOAM, Ansys FLUENT.

CAD softwares SolidEdge, SolidWorks, Autodesk Fusion360.

Machine Learning scikit-learn, PyTorch.

Other softwares Paraview, Tecplot, Cantera, ModeFRONTIER.

Operating systems MAC, Windows, Unix-based.

PERSONAL SKILLS

Mother tongue Italian

Other languages

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1
Spanish	B2	B2	B1	B1	B1
Romanian	B2	B2	B1	B1	B1

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user
[Common European Framework of Reference for Languages](#)

Other skills Former swimmer at a competitive level.

Driving licence B

ACADEMIC APPOINTMENTS

14 May 2024 Qualification of Subject Matter Expert (Cultore della Materia) of the Faculty of Civil and Industrial Engineering - Sapienza University of Rome (Department of Mechanical and Aerospace Engineering, DIMA) for the three-year period 2024-2026 in relation to the teaching of Aeronautical Propulsion Laboratory (Laboratorio di Propulsione Aeronautica) and Aeronautical Propulsion Systems (Sistemi Propulsivi Aeronautici), SSD ING-IND/07.

ACADEMIC ACTIVITIES

Teaching assistant 2023-2024 Aeronautical Propulsion Laboratory (Laboratorio di Propulsione Aeronautica), Bachelor's Degree in Aerospace Engineering, Sapienza University of Rome.
Course holder: Prof. Pietro Paolo Ciottoli.

Tutor 2021-2022 Aeronautical Engines (Motori Aeronautici), Master's Degree in Aeronautical Engineering, Sapienza University of Rome.
Course holder: Prof. Mauro Valorani.

Thesis co-supervisor Bachelor's Degree in Aerospace Engineering and Master's Degree in Aeronautical Engineering, Sapienza University of Rome.
Main thesis supervisor: Prof. Pietro Paolo Ciottoli.

Peer-review service Brazilian Journal of Chemical Engineering, Springer.

RESEARCH PROJECTS

PRIN 2022 Research projects of national interest 2022, member of Research Unit 1 in the context of the "NextGenSProDesT: Next Generation Space Propulsion Design Techniques" project.
Principal Investigator: Prof. Pietro Paolo Ciottoli, Sapienza University of Rome.

Avvio alla Ricerca 2023 Principal Investigator in the context of the "Toward Fly Net Zero: A Comprehensive Framework for Sustainable Aviation Fuel Combustion Characterization", Sapienza University of Rome.

Avvio alla Ricerca 2022 Principal Investigator in the context of the “Multi-Fidelity Approach in CFD-Based Design Optimization of Spray Combustion Systems for Ultra-Efficient Low-Carbon Aircraft Engines”, Sapienza University of Rome.

PUBLICATIONS

- [1] **J. Liberatori**, R. Malpica Galassi, D. Bianchi, F. Nasuti, M. Valorani, and P.P. Ciottoli. “Family of Skeletal Reaction Mechanisms for Methane-Oxygen Combustion in Rocket Propulsion”. In: *Journal of Propulsion and Power* 40.2 (2024), pp. 303–319.
- [2] **J. Liberatori**, F. Battista, F. Dalla Barba, and P.P. Ciottoli. “Direct Numerical Simulation of Vortex Breakdown in Evaporating Dilute Sprays”. In: *Flow, Turbulence and Combustion* 112 (2024), pp. 643–667.
- [3] L. Lucchese, **J. Liberatori**, D. Cavalieri, D. Simone, D. Liuzzi, M. Valorani, and P.P. Ciottoli. “Impact of Chemical Modeling on the Numerical Analysis of a LOx/GCH4 Rocket Engine Pintle Injector”. In: *Acta Astronautica* 218 (2024), pp. 240–250.
- [4] **J. Liberatori**, M. Valorani, and P.P. Ciottoli. “Anisotropy Analysis of Vortex Breakdown States via Direct Numerical Simulation”. In: *International Journal of Heat and Fluid Flow* 109 (2024), p. 109531.
- [5] D. Cavalieri, **J. Liberatori**, M. Blandino, P.E. Lapenna, M. Valorani, and P.P. Ciottoli. “Impact of non-ideal fluid modeling on droplet evaporation for aerospace applications”. In: *Flow, Turbulence and Combustion (accepted for publication)* (2024).
- [6] L. Lucchese, **J. Liberatori**, D. Cavalieri, D. Simone, D. Liuzzi, M. Valorani, and P.P. Ciottoli. “Effect of Radial Mass Flow Rate Partition on LOx/GCH4 Pintle Injector Configurations”. In: *Journal of Propulsion and Power (accepted for publication)* (2024).
- [7] **J. Liberatori**, D. Cavalieri, R. Malpica Galassi, M. Valorani, and P.P. Ciottoli. “BayeSAF: A Bayesian Framework for Physicochemical Surrogate Emulation and Design of Sustainable Alternative Fuels”. In: *Fuel (submitted for publication)* (2024).
- [8] M. Blandino, M.M. Molinari, **J. Liberatori**, P.P. Ciottoli, and R. Malpica Galassi. “Impact of Well-to-Tank Efficiency and Emissions on Hybrid Aircraft Design Optimization”. In: *34th Congress of the International Council of the Aeronautical Sciences*. 2024.
- [9] **J. Liberatori**, D. Cavalieri, M. Blandino, R. Malpica Galassi, M. Valorani, and P.P. Ciottoli. “Large Eddy Simulations of Conventional and Alternative Aviation Fuel Spray Breakup”. In: *AIAA Aviation 2024 Forum*. 2024.
- [10] M. Blandino, M.M. Molinari, **J. Liberatori**, P.P. Ciottoli, and R. Malpica Galassi. “Aircraft Design With Well-to-Wake Optimization Under Uncertainty”. In: *AIAA Aviation 2024 Forum*. 2024.
- [11] **J. Liberatori**, D. Cavalieri, R. Malpica Galassi, M. Valorani, and P.P. Ciottoli. “BayeSAF: A Bayesian Framework for Modeling Physicochemical Surrogates of Sustainable Alternative Fuels”. In: *9th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2024)*. 2024.
- [12] **J. Liberatori**, D. Cavalieri, R. Malpica Galassi, M. Valorani, and P.P. Ciottoli. “BayeSAF: A Bayesian Framework for Modeling Physicochemical Surrogates of Sustainable Alternative Fuels”. In: *SIAM Conference on Uncertainty Quantification (UQ24)*. 2024.
- [13] M. Blandino, **J. Liberatori**, D. Cavalieri, M. Valorani, and P.P. Ciottoli. “Turbulence Closure Assessment in URANS of a Cold-Flow Lab-Scale Swirled Burner”. In: *AIAA SciTech 2024 Forum*. 2024.
- [14] L. Lucchese, **J. Liberatori**, D. Cavalieri, D. Simone, D. Liuzzi, M. Valorani, and P.P. Ciottoli. “Pintle Injector Performance Sensitivity to the Radial Injection Arrangement”. In: *AIAA SciTech 2024 Forum*. 2024.
- [15] **J. Liberatori**, R. Malpica Galassi, M. Valorani, and P.P. Ciottoli. “Uncertainty quantification analysis of Reynolds-averaged Navier–Stokes simulation of spray swirling jets undergoing vortex breakdown”. In: *International Journal of Spray and Combustion Dynamics* 15.4 (2023), pp. 218–236.

- [16] L. Angelilli, **J. Liberatori**, P.P. Ciottoli, F.E. Hernández Pérez, R. Malpica Galassi, M. Valorani, and H.G. Im. "A Stokes number-based improvement for stochastic dispersion model for large eddy simulation". In: *"Atomization and Sprays 33.9 (2023)"*, pp. 35–55.
- [17] **J. Liberatori**, R. Malpica Galassi, M. Valorani, and P.P. Ciottoli. "CSP-Driven Optimization of a 16-Species Skeletal Mechanism for Methane Ignition at High Pressure". In: *AIAA SciTech 2023 Forum*. 2023.
- [18] D. Cavalieri, **J. Liberatori**, R. Malpica Galassi, P.E. Lapenna, M. Valorani, and P.P. Ciottoli. "Unsteady RANS Simulations with Uncertainty Quantification of Spray Combustor Under Liquid Rocket Engine Relevant Conditions". In: *AIAA SciTech 2023 Forum*. 2023.
- [19] **J. Liberatori**, R. Malpica Galassi, D. Liuzzi, A. Filosa, M. Valorani, and P.P. Ciottoli. "Uncertainty quantification in RANS prediction of LOX cross-flow injection in Methane". In: *AIAA Propulsion and Energy 2021 Forum*. 2021.

Il sottoscritto dichiara di essere consapevole che il presente curriculum vitae sarà pubblicato sul sito istituzionale dell'Ateneo, nella Sezione "Amministrazione trasparente", nelle modalità e per la durata prevista dal d.lgs. n. 33/2013, art. 15.