



Mario Tindaro Migliorino

WORK EXPERIENCE

Research Fellow

Sapienza University of Rome [2019 – Current]

Address: Rome (Italy)

City: Rome

Country: Italy

Research interests: hybrid and liquid rocket engines, hypersonics

Teaching activities: space propulsion, model rocketry

Research Assistant

Purdue University [2015 – 2018]

Address: West Lafayette, Indiana (United States)

City: West Lafayette

Country: United States

CFD simulations for fundamental research on thermoacoustics in supercritical fluids. Design of a transcritical thermoacoustic prototype in the thermal management team at the Rolls-Royce University Technology Center

EDUCATION AND TRAINING

Ph.D. in Mechanical Engineering

Purdue University [2015 – 2018]

Address: West Lafayette, Indiana (United States)

GPA: 4.0/4.0

Thesis: "Numerical and Theoretical Modeling of Thermoacoustic Instabilities in Transcritical Fluids"

M.Sc. in Space Engineering

Sapienza University of Rome [2013 – 2015]

Address: Rome (Italy)

110/110 *cum laude*

Thesis: "Transient Response of Homogeneous Isotropic Turbulence to Heat Sources"

B.Sc. in Aerospace Engineering

Sapienza University of Rome [2010 – 2013]

Address: Rome (Italy)

110/110 *cum laude*

Thesis: "Effect of Friction and Cooling on the Performance of Supersonic Nozzles"

LANGUAGE SKILLS

Mother tongue(s):

Italian

Other language(s):

English

LISTENING C1 READING C1 WRITING C1

SPOKEN PRODUCTION C1 SPOKEN INTERACTION C1

DIGITAL SKILLS

Tecplot 360 / Microsoft Office / Inkscape / Python / Fortran / Matlab / vim / LaTeX / bash scripting
/ Git / C++ / CFD / RANS

PUBLICATIONS

Peer-reviewed journal articles

4 Onset Criteria for Bulk-Mode Thermoacoustic Instabilities in Supercritical Hydrocarbon Fuels, S. Hunt, **M. T. Migliorino**, C. Scalo, S. D. Heister, Journal of Fluids Engineering, 2021

3 Numerical analysis of paraffin-wax/oxygen hybrid rocket engines, **Migliorino, M.T.**, Bianchi, D., Nasuti, F., Journal of Propulsion and Power, 2020

2 Real-fluid effects on standing-wave thermoacoustic instability, **Migliorino, M.T.**, Scalo, C., Journal of Fluid Mechanics, 2020

1 Heat-induced planar shock waves in supercritical fluids, **Migliorino, M.T.**, Scalo, C., Shock Waves, 2020

Conference articles

- 9 A sensitivity study on a CFD model for paraffin-based hybrid rockets, **Migliorino, M.T.**, Bianchi, D., Nasuti, F., AIAA Propulsion and Energy Forum, 2020
- 8 Numerical and experimental analysis of capsules ablation and shape change including heating transient effects, Rotondi, M., **Migliorino, M.T.**, Bianchi, D., Pagani, P., Turchi, A., AIAA Propulsion and Energy Forum, 2020
- 7 Numerical analysis of nozzle heating and erosion in hybrid rockets and comparison with experiments, Bianchi, D., **Migliorino, M.T.**, Rotondi, M., Kamps, L., Nagata, H., AIAA Propulsion and Energy Forum, 2020
- 6 Predictive CFD model for internal ballistics of hybrid rocket engines using supercritical paraffin-wax and oxygen, **Migliorino, M.T.**, Bianchi, D., Nasuti, F., AIAA Propulsion and Energy Forum, 2019
- 5 CFD analysis of paraffin-based hybrid rockets with coupled nozzle erosion characterization, Bianchi, D., **Migliorino, M.T.**, Nasuti, F., Onofri, M., AIAA Propulsion and Energy Forum, 2019
- 4 Assessment of spurious numerical oscillations in high-order spectral difference solvers for supercritical flows, **Migliorino, M.T.**, Chapelier, J.-B., Scalo, C., Lodato, G., AIAA Aviation Forum, 2018
- 3 Numerical and experimental analysis of a transcritical thermoacoustic prototype, Alexander, D., **Migliorino, M.T.**, Heister, S., Scalo, C., AIAA Aviation Forum, 2018
- 2 Dimensionless scaling of heat-release-induced planar shock waves in near-critical CO₂, **Migliorino, M.T.**, Scalo, C., AIAA SciTech Forum, 2017
- 1 Real fluid effects on thermoacoustic standing-wave resonance in supercritical CO₂, **Migliorino, M.T.**, Gupta, P., Scalo, C., AIAA SciTech Forum, 2017

Patents

System and Method for Stabilizing Transcritical Air-to-Fuel Heat Exchange, P. C. Sweeney, S. D. Heister, S. A. Hunt, C. Scalo, **M. T. Migliorino**, US Patent No. US 10,890,114 B2 (granted on 12 January 2021)

RECOMMENDATIONS

- Prof. Francesco Nasuti (PostDoc Mentor and B.Sc. Advisor, Sapienza University)
- Prof. Daniele Bianchi (PostDoc Mentor, Sapienza University)
- Prof. Carlo Scalo (Ph.D. Advisor and Mentor, Purdue University)
- Prof. Stephen D. Heister (Ph.D. Mentor, Purdue University)
- Prof. Bernardo Favini (M.Sc. Advisor, Sapienza University)

HONOURS AND AWARDS

Awards

- 2017 Rolls-Royce Doctoral Fellowship, Purdue University, IN, USA
- 2015 F. N. Andrews Fellowship, Purdue University, IN, USA
- 2015 Antonio Ventura Scholarship, Fondazione Roma Sapienza, Rome, Italy
- 2015 Excellence Path in Space Engineering, Sapienza University of Rome, Italy
- 2011–2013 Excellence Path in Aerospace Engineering, Sapienza University of Rome, Italy
- 2010–2013 Sapienza Deserving Student, Sapienza University of Rome, Italy
- 2010 Italian Ministry of Education Award for High School Excellence, Nomentano, Rome, Italy

TEACHING

Teaching

Spring 2020: Lecturer on "CEA - Chemical Equilibrium with Applications" in the framework of the Master Course in Space Transportation Systems. Sapienza, Rome, Italy

Spring 2019: Teaching assistant in the courses "Space Propulsion" and "Space Propulsion Lab". Taught lectures and held tutoring sessions to classes of 15 graduate students and 40 undergraduate students, respectively. Sapienza, Rome, Italy

Spring 2018: Teaching assistant in the course "Introduction to Computational Fluid Dynamics, ME497". Taught lectures and held tutoring sessions to a class of 15 undergraduate students. Purdue University, IN, USA

OTHER RELEVANT EXPERIENCE

Events organized

July 2019: Reference and organizer of Sapienza University for the 20th CVA Summer School held in Rome and Colleferro, Italy

University student teams

July 2014: AIAA Cansat Competition, Sapienza Space Team (10 people): designed, built and launched an atmospheric probe model, Burkett, TX, USA

July 2013: CVA Summer School, Team leader of 11 people: designed a rocket model fired to 500m, Lampoldshausen, Germany

Thesis Co-Advisor

Co-advisor of more than 10 M.Sc. and B.Sc. theses with advisors Prof.s F. Nasuti, D. Bianchi, S. Heister

Contracts

SPIV (Sistema Propulsivo Ibrido VEGA, AVIO-ASI): January 2020 - present

RIPAS (Rilancio dei Programmi di Accesso allo Spazio dalla Base di Malindi Luigi Broglio Space Centre (BSC) ASI): January 2019 - present

Invited talks

Numerical and Theoretical Modeling of Thermoacoustic Instabilities in Transcritical Fluids, Sapienza University, Rome, Italy (14/2/2019)

High-order Numerical Simulations of Thermoacoustic Instabilities in Transcritical Single-Phase Fluids, INSA-Coria, Rouen, France (17/10/2018)