

PIETRO M. F. MAISTO

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Multi-degree aerospace/mechanical engineer with expertise in experimental fluid dynamics (laser diagnostics), propulsion systems, turbulence and fire flows. Entitled to work in the U.S. under F-1 Visa Optional Practical Training (OPT), and green card applicant under the category of “Exceptional Ability and Advanced Degree” (EB-2).

EDUCATION

University of Maryland

August 2019

Ph.D. in MECHANICAL ENGINEERING

Focus: Experimental thermo-fluid dynamics

Advisor: Prof. Michael J. Gollner

Overall GPA: 3.175

Virginia Tech

February 2014

M.Sc. in AEROSPACE ENGINEERING

Focus: Fluid mechanics and advanced diagnostics for propulsion applications

Advisor: Prof. K. Todd Lowe

Overall GPA: 3.53

University of Rome “La Sapienza” (School of Aerospace Engineering)

January 2011

M.Sc. Summa cum Laude in ASTRONAUTICAL ENGINEERING

Focus: Sensor design for hypersonic air-breathing propulsion

Advisor: Prof. Claudio Bruno, Co-Advisor: Dr. Joseph A. Schetz (Virginia Tech)

Overall GPA: 30/30

University of Rome “La Sapienza”

February 2007

B.Sc. in AEROSPACE ENGINEERING

Focus: Space propulsion systems design

Advisor: Prof. Stefano Atzeni

Overall GPA: 30/30

RESEACRH FOCUS AND EXPERTISE

Area(s) of Interest

Fluid Mechanics, Aerodynamics, Propulsion (air-breathing/rocket), Combustion, Heat transfer, Thermodynamics, Turbulence, Advanced Diagnostics, Image and Signal Data Processing, High-Speed Flows, Buoyant Flows, Fire Dynamics.

Lab Skills

Laser Diagnostics: Particle Image Velocimetry (PIV), Planar Laser Induced Fluorescence (PLIF), Pulsed and Continuous Lasers, Optics, Design of Test Flow Devices, Wind Tunnel Testing.

Computer Skills

Matlab, LaVision-DaVis 7.2/8.2, LabView, ANSYS-CFX, Fortran 90/95, SolidWorks, Microsoft Office, Latex.

WORK EXPERIENCE

Constellation Dynamics, LLC

September 2019

Research and Development Engineering Manager

Worked under Optional Practical Training (OPT) on several project research grant proposals for Constellation Dynamics LLC (Los Angeles, CA) on shock wave abatement employing cryogenic (liquid nitrogen supercooled) hypersonic devices at Mach 5.

Constellation Dynamics, LLC

May 2013

Research Assistant

Worked on a project funded by Constellation Dynamics LLC (Los Angeles, CA) and developed at Virginia Tech on shock wave abatement employing cryogenic (liquid nitrogen supercooled) hypersonic devices at Mach 5. Independently designed shadowgraph optical setup for the experiments, ran tests at the VT-Hypersonic Wind Tunnel, data acquisition, post-processing analysis and proposal preparation. Contributed through technical support and collaboration to the USPTO #9,193,457 / #9,297,625 / #9,550,586 patents by Charles E. Janeke (Constellation Dynamics LLC, CEO).

RESEARCH EXPERIENCE

University of Maryland, Mechanical Engineering Dept.

March 2014-July 2019

Graduate Research Assistant - Gollner's Fire Group

- Experimentally investigated the turbulent transport and mixing of (1) an unconfined fire plume and of (2) a buoyant jet impinging onto a sloped plate (0 up to 40 deg.) using a laser-assisted scaled saltwater modeling technique.
- Designed and 3D-printed an injector flow apparatus able to provide quick laminar to turbulent flow transition (required by the measurements) through an inner honeycomb screen.
- Demonstrated the ability to probe Large Eddy Simulations (LES) grid-resolved and sub-grid unresolved statistical moments using highly-spatially-resolved Particle Image Velocimetry (PIV) and Planar Laser Induced Fluorescence (PLIF) measurements.
- Developed a pixel-based low-pass filtering method to apply to highly-resolved images (PIV and PLIF) and identify spatial resolutions for velocity and concentration (temperature) converged statistics of an unconfined plume. The results obtained provided useful guidelines to evaluate the performance of available models in predicting fire suppression.

Virginia Tech, Aerospace & Ocean Engineering Dept.

August 2011-February 2014

Graduate Research Assistant - Vortical Flow and Diagnostics Laboratory

- Conducted experiments and data analysis in a project funded by National Institute of Aerospace (NIA) and NASA LaRC (NASA Langley-Advanced Measurements and Data System Branch (A.M.D.S.B.)) for the characterization of dye-doped polystyrene microspheres for advanced flow diagnostics in large test devices at NASA LaRC. The tests were performed at the Vortical Flow and Diagnostics Laboratory at Virginia Tech employing batches of particles synthesized with different fluorescent dyes by the NASA research group.
- Independently designed specific optical setups for two-color LIF, PIV and Mie scattering laser excitation techniques.
- Independently designed and built small cold flow rigs to test the batches and a large seeder for the hot-high-speed jet facility at Virginia Tech.
- Tested the different batches of particles using different laser light sources (pulsed and continuous laser) and varying the energy density to evaluate the prospective applications for flow diagnostics based on their response. Performed data acquisition and processing to quantify turbulence intensities and transport characteristic of the flow.
- Presented the research at the 43rd AIAA-Fluid Dynamics Conference in San Diego (CA) in 2013, co-Authored 1 NASA technical memorandum, 1 NASA report, 2 journal peer-reviewed papers and 1 conference paper. This investigation was included in the Master thesis defended at Virginia Tech in 2014 and ultimately published.
- Worked on a side-project funded by Rolls Royce on Rayleigh scattering laser technique for simultaneous flow density and temperature measurements. Independently developed codes and procedures to analyze synthetic data to compare with real tests. The results were presented at the 42nd AIAA-Fluid Dynamics Conference and Exhibit in New Orleans (LA) in June 2012.

Virginia Tech, Aerospace & Ocean Engineering Dept.

July 2010-January 2011

Visiting Scholar - Dr. Schetz Research Group

- Worked for a Small Technology Transfer (STTR) project funded by the Air Force Office of Scientific Research (AFOSR) and developed by Virginia Tech and Nanosonic Inc. (Pembroke, VA). The research involved the development of devices for direct measurements of skin friction and heat flux in hot, high-speed flows, implementing “smart” nanomaterials for wall shear sensing.
- Independently designed thermal/structural analysis for two sensor configurations—regenerative cooling

(JP-10 jet fuel) and passive-ablative cooling, both including the Metal Rubber by Nanosonic as sensing material. The analysis were performed with ANSYS assuming Mach 3 flow and 2 sec. test duration for the Virginia Tech Hypersonic Wind Tunnel (VT-HST). An additional study was conducted for flow conditions characteristic of the Hyper-X Engine Model (HXEM) NASA facility, where a 150 kW/m^2 wall heat flux was assumed for 10 sec. at the surface.

- Achieved optimal sensor design for the VT-HST and NASA-HXEM test chambers consisting of a recessed layer of Metal Rubber beneath a heat-sink layer (Macor-ceramic material for the VT-HST, and JP-10 fuel cooled/stainless steel for the NASA-HXEM facility).
- Presented research in front of Dr. J.D. Schmisser (Chief of Energy, Power and Propulsion Sciences Division of the AFOSR) for the approval of phase II of the project (ultimately accepted).
- This research was the core of the M.Sc. thesis in Astronautics Engineering (2011) defended in Rome and awarded as “Best Master of Science Thesis Award” in Engineering from “La Sapienza” University.

TEACHING EXPERIENCE

- **University of Maryland (Mechanical Engineering Dept.):** Fluid Mechanics, Thermodynamics, Fire Dynamics.
- **Virginia Tech (Aerospace and Ocean Engineering Dept.):** Vehicle Propulsion, Aero-Hydrodynamics, Compressible Fluid Dynamics, Combustion and Laser Diagnostics, Boundary Layer and Heat Transfer, Hypersonic Aerodynamics.

PUBLICATIONS

NASA Technical Memorandum

- 2017 Danehy P.M., Tiemsin P.I., Wohl C.J., Verkamp M., Lowe K.T., **Maisto P.**, Byun G., Simpson R., *Fluorescent Doped Particles for Simultaneous Temperature and Velocity Imaging*, NASA Langley Research Center, Hampton, VA, USA, 2012. NASA/TM-2012-217768.

Journal Articles

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| UNDER REVIEW | P. Maisto , M.J. Gollner, A.W. Marshall, <i>Highly Resolved Turbulent Plume Transport Measurements using Saltwater Modeling</i> , Fire Safety Journal. |
| IN PREPARATION | P. Maisto , M.J. Gollner, A.W. Marshall, <i>Saltwater Modeling for Unconfined Sloped Ceiling Jet Characterization</i> , Fire Technology Journal. |
| IN PREPARATION | P. Maisto , M.J. Gollner, A.W. Marshall, <i>Saltwater Modeling of Unconfined Sloped Ceiling Sprinkler Activation</i> , Fire Technology Journal. |
| 2015 | C.J. Whol, J.M. Kiefer, B.J. Petrosky, P.I. Tiemsin, K.T. Lowe, P.M.F. Maisto and P.M. Danehy, <i>Synthesis of Fluorophore-Doped Polystyrene Microspheres: Seed Material for Airflow Sensing</i> , ACS Applied Material and Interfaces Journal, August 15 th , 2015. |
| 2013 | Lowe K.T., Maisto P. , Byun G., Simpson R., Verkamp M., Danehy P.M., Tiemsin P.I. and Wohl C.J., <i>Laser Velocimetry with Fluorescent Dye-Doped Polystyrene Microspheres</i> , Optics Letter Journal, Vol. 38, No. 8, April 15 th , 2013. |

Conference Articles

- 2017 **P.M.F. Maisto**, A.W. Marshall, M.J. Gollner, *Predicting Detector Response Time Using Saltwater Modeling on Sloped Ceilings*, 16th International Conference on Automatic Fire Detection AUBE & Suppression, Detection and Signaling Research and Applications Conference SUPDET 2017, Hyattsville, MD, 12-14 September 2017.
- 2017 **P.M.F. Maisto**, A.W. Marshall, M.J. Gollner, *Characterization of sloped ceiling jet flow using laser-assisted saltwater modeling technique*, 10th U.S. National Combustion Meeting, Hyattsville, MD, 23-26 April 2017.

- 2015 **P.M.F. Maisto**, T. Layton, M.J. Gollner, A.W. Marshall, *Salt-Water Modeling to Probe Sub-Grid Scale Turbulent Mixing of Large Fire Plumes*, 9th National Combustion Meeting, Cincinnati, OH, 17-20 May 2015.
- 2015 B.J. Petrosky, **P.M.F. Maisto**, K.T. Lowe, A.A. Matthieu, P.M. Bardet, P.I. Tiemsin, C.J. Wohl, P.M. Danehy, *Particle Image Velocimetry Applications Using Fluorescent Dye-Doped Particles*, 53rd AIAA Aerospace Science Meeting, Kissimmee, FL, 5-9 January 2015.
- 2014 You Y.G., Yin M., Martin D., Meacham B., Dembsey N., Gollner M., **Maisto P.**, Ahrens M., Grant C., Rodrigue T., *Quantification of Green Building Features on Firefighter Safety: Problem Definition, Data Collection, Preliminary Analysis and Experimental Plan*, SFPE 10th International Conference on Performance-Based Codes and Fire Safety Design Methods, Brisbane, Australia, 2014.
- 2013 **Maisto P.M.F.**, Lowe K.T., Byun G., Simpson R., Verkamp M., Danley J.E., Koh B., Tiemsin P.I., Danehy P.M. and Wohl C.J., *Characterization of fluorescent polystyrene microspheres for advanced flow diagnostics*, 43rd AIAA Fluid Dynamics Conference, San Diego, CA, 24-27 June 2013. NASA NF1676L-15707.
- 2012 I. J. Yeaton, **P.M.F. Maisto** and K.T. Lowe, *Time Resolved Filtered Rayleigh Scattering for Temperature and Density Measurements*, 28th AIAA Aerodynamic Measurement Technology, Ground Testing, and Flight Testing Conference, New Orleans, LA, 25-28 June 2012.

Non-refereed Abstracts and Presentations

- 2017 **P.M.F. Maisto**, Andre W. Marshall, Michael J. Gollner, *A Virtual Study of Grid Resolution on Experiments of a Highly-Resolved Turbulent Plume*, 70th Annual Meeting of the APS Division of Fluid Dynamics (DFD), Denver, CO, 18-21 November 2017.
- 2015 **P.M.F. Maisto**, Andre W. Marshall, Michael J. Gollner, *Quantitative saltwater modeling for validation of sub-grid scale LES turbulent mixing and transport models for fire*, 68th Annual Meeting of the APS Division of Fluid Dynamics (DFD), Boston, MA, 22-24 November 2015.

Published Thesis

- 2019 **Maisto P.**, *Turbulent Transport and Mixing of Unconfined and Sloped Fire-Induced Flows Using A Laser-Assisted Saltwater Modeling Technique*, Ph.D. Dissertation, University of Maryland, College Park, MD, USA, 2019.
- 2014 **Maisto P.**, *Experimental Analysis and Prospective Flow Diagnostic Applications for Fluorescence Dye-Doped Microparticles*, M.Sc. Thesis, Virginia Tech, Blacksburg, VA, USA, 2014.

CONFERENCES ATTENDED/PRESENTED

Attended

- 2013 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, PA, 24-26 November 2013.
- 2012 50th AIAA Aerospace Sciences Meeting, Nashville, TN, 9-12 January 2012.

Presented

- 2017 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO, 19-21 November 2017.

- 2017 16th Conference on Automatic Fire Detection-AUBE Suppression, Detection and Signaling Research and Application Conference-SUPDET, College Park, MD, 12-14 September, 2017.
- 2017 10th U.S. National Combustion Meeting, Hyattsville, MD, 23-26 April, 2017.
- 2015 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, MA, 22-24 November 2015.
- 2015 9th U.S. National Combustion Meeting, Cincinnati, OH, 17-20 May, 2015.
- 2013 43rd AIAA Fluid Dynamics Conference, San Diego, CA, 24-27 June 2013.
- 2012 28th AIAA Aerodynamic Measurement Technology, Ground Testing, and Flight Testing Conference, New Orleans, LA, 25-28 June 2012.
- 2011 “Liquid Space Propulsion” Conference and Lectures by Dr. Vladimir G. Bazarov, Italian Center for Aerospace Research (CIRA), Capua, Italy, 7-18 May 2011.

GRANTS, AWARDS, HONORS AND SERVICE

Grants

- 2017 70th American Physics Society-DFD Meeting Burgers Program Funds (Total:\$500)
- 2015 9th U.S. National Combustion Meeting ESS Student Travel Grant (Total:\$250)
- 2011 *Italian Student Fund for American Studies* Association Grant (Total:\$25,000)

Awards

- 2011 “*Best Master of Science Thesis Award*” from the University of Rome “La Sapienza”
- 2007 Italian Space Agency (ASI)– “*Certificate of Recognition for Scientific Contribution to the National Space Program*”
- 2007 Italian Space Agency (ASI)– “*Best Space Transportation Systems Award*”

Honors

- 2001 *Alfiere del Lavoro*–Honor medal conferred by the President of the Italian Republic in recognition of the commitment and motivation shown during academic studies

Service

- 2017 Organization reception 10th U.S. National Combustion Meeting, Hyattsville, MD, April 2017

PROFESSIONAL AFFILIATIONS

- 2016- Sigma Gamma Tau Honor Society
- 2016- UMD-AIAA Honor Student Association
- 2015- American Physical Society
- 2014- Combustion Institute
- 2011- American Institute of Aeronautics and Astronautics (AIAA)

REFERENCES

- Claudio Bruno** Head of the High Speed Group at the United Technologies Research Center (UTRC) and Research Professor (former M.Sc. Advisor and B.Sc. Co-Advisor) University of Connecticut (UConn), Mechanical Engineering Department, United Technologies Engineering Building, Rm. 350, Storrs, CT 06269
claudio.bruno@uconn.edu; Phone: (860) 486-2441; Fax: (860) 486-5088
- Joseph A. Schetz** Fred D. Durham Endowed Chair (former M.Sc. Co-Advisor) Virginia Tech, Aerospace & Ocean Engineering Department Randolph Hall, RM 224-9, 460 Old Turner St., Blacksburg, VA 24061
ptiger@vt.edu; Phone: (540) 231-9056
- K. Todd Lowe** Associate Professor (former M.Sc. Advisor) Virginia Tech, Aerospace & Ocean Engineering Department McBryde Hall, RM 660C, Blacksburg, VA 24061
kelowe@vt.edu; Phone: (540) 231-7650
- Nicola Pecile** Test Pilot Engineer (Peer and Classmate) Virgin Galactic Orbit 16555 Spaceship Landing Way, Mojave, CA 93501
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