Dr. Carlo Scalo

Associate Professor of Mechanical Engineering, and
Aeronautical and Astronautical Engineering (by courtesy)
Purdue University, West Lafayette, 47907
https://engineering.purdue.edu/~scalo/

CEO/Founder of HySonic Technologies, LLC
Purdue Research Park, West Lafayette, IN, 47906-4182

SME in Hypersonics, Purdue Temp-Faculty Scholar (03/24-03/25)
Advanced Concepts Engineering / Missile Test Branch (GXWZ)
Global Deterrence and Defense Department
Naval Surface Warfare Center, Crane Division, (NSWC Crane)

Appointments

Associate Professor	Mechanical Engineering	Purdue University, USA	2020 – current
Hypersonics SME	US Navy	NSWC Crane, IN, USA	2024 – 2025
Assistant Professor	Mechanical Engineering	Purdue University, USA	2014 – 2020
Postdoctoral Fellow	Center for Turbulence Research	Stanford University, USA	2012 – 2014
Doctor of Philosophy (Ph.D.)	Mechanical Engineering	Queen's University, Canada	2009 – 2012
Masters of Science (M.Sc.)	Aerospace and Astronautics	Università Federico II, Italy	2006 – 2008
Bachelor of Science (B.Sc.)	Aerospace Engineering	Università Federico II, Italy	2003 – 2006

Academic Honors & Awards

Office of Naval Research - Young Investigator Award (ONR-YIP) in *Hypersonic Turbulence*	2020 – 2023
Army Research Office - Young Investigator Award (ARO-YIP) in *Large-Eddy Simulation*	2018 – 2020
Air Force Office of Scientific Research - Young Investigator Award (AFOSR-YIP) in *Hypersonic Transition*	2018 – 2021
Postdoctoral Fellowship, CTR, NASA/Stanford University	2012 – 2014
RISUM-Campaniaerospace Research Grant in *Turbulence Modeling*	2011 – 2012
Duncan and Urlla Carmichael Fellowship	2010 – 2011
Sun Microsystems of Canada Scholarship in *High-Performance Computing*	2009 – 2010
Louisa A. Fowler Graduate Fellowship	2009 – 2012
Gianni Astarita Prize (*)	2005 – 2006

(*) *The Gianni Astarita Prize is awarded to the graduate achieving the highest GPA among the following Engineering Departments at the Universitá Federico II (Italy): Aerospace, Mechanical, Civil, Naval, Industrial and Chemical.*

Publications

- Indradip Roy and, **Carlo Scalo**, *Disturbance energy budget of linear and nonlinear second-mode waves*, Journal of Fluid Mechanics, 2025, Vol 1007, A49 — 2025

- Rico Schmidt, Hossam Yousef, Indradip Roy, **Carlo Scalo**, and Mostafa Nouh, *Perturbation Energy Extraction from a Fluid via a Subsurface Acoustic Diode with Sustained Downstream Attenuation,* Journal of Applied Physics, 137, 054901 — 2025

- Takahiko Toki, Victor C. B. Sousa, Yongkai Chen, Camillo Giannino-Ponchio, Alexander Wagner, and, **Carlo Scalo**. *Large-eddy simulations of conical hypersonic turbulent boundary layers over cooled walls via volumetric rescaling method*. Journal of Fluid Mechanics. 2025;1003:A28 — 2025

- Victor Sousa, Viola Wartemann, Alexander Wagner and, **Carlo Scalo**, *Dynamic large-eddy simulation of hypersonic transition delay over broadband wall impedance*. Journal of Fluid Mechanics. Vol 999:A41. — 2024

- Takahiko Toki, Victor C. B. Sousa, Yongkai Chen and, **Carlo Scalo**, *Sub-filter-scale shear stress analysis in hypersonic turbulent Couette flow, Journal of Fluid Mechanics*, 2024, Vol 984, A53 — 2024

- Vaibhav Rajora, Tariq Aslam, Wesley W. Chapman, Chad Meyer, Steve F. Son, **Carlo Scalo**, *A block-spectral adaptive H-/p-refinement strategy for shock-dominated problems*, Journal of Computational Physics, Volume 514, 113255 — 2024

- Jean-Baptiste Chapelier, David J. Lusher, William Van Noordt, Christoph Wenzel, Tobias Gibis, Pascal Mossier, Andrea Beck, Guido Lodato, Christoph Brehm, Matteo Ruggeri, **Carlo Scalo**, Neil Sandham; *Comparison of high-order* — 2024

numerical methodologies for the simulation of the supersonic Taylor–Green vortex flow. Physics of Fluids 1 36 (5): 055146.

- Giannino Ponchio Camillo, Alexander Wagner, Takahiko Toki and, **Carlo Scalo**, *Combined Exp. and Num. Investigation of a Hypersonic Turbulent Boundary Layer by Means of FLDI and Large-Eddy Simulations*, Aerospace, 2023, Vol 10(6), 570 — 2023

- Victor C. B. Sousa, Viola Wartemann, Alexander Wagner and, **Carlo Scalo**, *Linear stability analysis of second-mode attenuation via porous carbon-matrix ceramics*, Physics of Fluids, 2023, Vol 35, Number 6 — 2023

- Carson L. Running, Benjamin L. Bemis, J. Luke Hill, Matthew P. Borg, Joel J. Redmond, Karl Jantze, **Carlo Scalo**, *Attenuation of hypersonic second-mode boundary-layer instability with an ultrasonically absorptive silicon-carbide foam*, Experiments in Fluids, 2023, Vol 64, pages 79 — 2023

- Giannino Camillo, Alexander Wagner, Takahiko Toki and **Carlo Scalo**, *Combine Experimental and Numerical Investigation of a Hypersonic Turbulent Boundary Layer by means of FLDI and Large Eddy Simulations*, Aerospace, Submitted. — 2023

- Matteo Ruggeri, Indradip Roy, Michael J. Mueterthies, Tom Gruenwald, **Carlo Scalo**, *Neural-network-based Riemann solver for real fluids and high explosives; application to computational fluid dynamics*, Physics of Fluids, 2022 — 2022

- Myungwon Hwang,**Carlo Scalo**, Andres F. Arrieta, *High-performance large-scale simulation of multi-stable metastructures*, Computer Physics Communications, 2022, Vol 277, pages 108365 — 2022

- Timo Buschhagen, Rohan Gejji, **Carlo Scalo**, and Carson Slabaugh, *Self-excited Instability Regimes of a Confined Turbulent Jet Flame at Elevated Pressure*, Physics of Fluids, Vol 34, Issue 4. — 2022

- Victor Sousa and **Carlo Scalo**, *A unified Quasi-Spectral Viscosity (QSV) approach to shock capturing and large-eddy simulation*, J. Comput. Phys., 2022, Vol 459, 1111139. — 2022

- Victor Sousa and **Carlo Scalo**, *A Legendre spectral viscosity (LSV) method applied to shock capturing for high-order flux-reconstruction schemes*, J. Comput. Phys., Vol 460, 111157. — 2022

- Ariana Martinez, Mario Tindaro Migliorino, **Carlo Scalo**, and Stephen D. Heister, *Experimental and numerical investigation of thermoacoustic instability under transcritical temperature conditions*, J. Acoust. Soc. Am., 2021, 150 (4) — 2021

- Steven Hunt, Mario Tindaro Migliorino, **Carlo Scalo**, and Stephen D. Heister, *Onset Criteria for Bulk-Mode Thermoacoustic Instabilities in Supercritical Hydrocarbon Fuels*, Journal of Fluids Engineering, 2021, 143(4): 040901 — 2021

- Yongkai Chen and **Carlo Scalo**, *Effects of Porous Walls on Near-wall Supersonic Turbulence*, Physical Review Fluids, 2021, Vol. 6, No. 8, 084607 — 2021

- Yongkai Chen and **Carlo Scalo**, *Trapped waves in supersonic and hypersonic turbulent channel flow over porous walls*, Journal of Fluid Mechanics, Vol. 920, A24 — 2021

- Xinran Zhao and **Carlo Scalo**, *Helicity Dynamics in Reconnection Events of Topologically Complex Vortex Flows*, Journal of Fluid Mechanics, Vol 920, A30 — 2021

- Xinran Zhao, Zongxin Yu, Jean-Baptiste Chapelier, **Carlo Scalo**, *Direct-numerical Simulation and Large-Eddy Simulation of Trefoil Knotted Vortices*, Journal of Fluid Mechanics, Vol 910, A31 — 2021

- Haitian Hao, **Carlo Scalo**, and Fabio Semperlotti, *Flexural-mode solid-state thermoacoustics*, Mechanical Systems and Signal Processing Vol. 148, pages 107143 — 2021

- Haitian Hao, **Carlo Scalo** and Fabio Semperlotti, *Axial-mode solid-state thermoacoustic instability: an analytical parametric study*, J. Sound Vib Vol. 470, pages 115159 — 2020

- Shubham Thirani, Prateek Gupta, and **Carlo Scalo**, *Knudsen number effects on the nonlinear acoustic spectral energy cascade*, Physical Review E Vol. 101, No. 2 — 2020

- Mario Tindaro Migliorino and **Carlo Scalo**, *Real-fluid effects on standing-wave thermoacoustic instability*, J. Fluid Mechanics, Vol. 883, A32 — 2020

- Mario Tindaro Migliorino and **Carlo Scalo**, *Heat-induced Planar Shock Waves in Supercritical Fluids*, Shock Waves, Vol. 30, pp. 1-15 — 2019

- Matthew X. Yao, Zeping Sun, **Carlo Scalo**, Jean-Pierre Hickey, *Vortical and thermal interfacial layers in wall-bounded turbulent flows under transcritical conditions*, Physical Review Fluids, Vol 4, No. 8, 084604 — 2019

- Kukjin Kim, Jean-Pierre Hickey, and **Carlo Scalo**, *Pseudophase Change Effects in Turbulent Channel Flow under Transcritical Temperature Conditions*, Journal of Fluid Mechanics, Vol. 871, pp. 52-91 — 2019

- Haitian Hao, **Carlo Scalo**, and Fabio Semperlotti, *Traveling and standing thermoacoustic waves in solid media*, Journal of — 2019

Sound and Vibration, Vol 449, pp. 30-42

- Jean-Baptiste Chapelier, Bono Wasistho and **Carlo Scalo**, *Large-Eddy Simulation of temporally developing double helical vortices*, Journal of Fluid Mechanics, Vol. 863, pp. 79-113 2019

- Victor Sousa, Danish Patel, Jean-Baptiste Chapelier, Viola Wartemann, Alex Wagner, and **Carlo Scalo**, *Numerical Investigation of Second Mode Attenuation over Carbon/Carbon Surfaces on a Sharp Slender Cone*, Journal of Spacecraft and Rockets, Vol. 56, No. 2, pp. 319-332. *__(invited)__ 2019

- Prateek Gupta and **Carlo Scalo**, *Spectral energy transport in acoustic wave turbulence*, Physical Review E, Vol. 98, Issue 3, Pages 033117. 2018

- Quentin Douasbin, **Carlo Scalo**, Laurent Selle and Thierry Poinsot *Delayed Time-Domain Impedance Boundary Conditions*, Journal of Computational Physics. Vol. 371, Pages 50-66 2018

- Haitian Hao, **Carlo Scalo**, Mihir Sen, and Fabio Semperlotti, *Thermoacoustics of solids: a pathway to solid state engines and refrigerators*, Journal of Applied Physics, Vol. 123, Issue 2 2018

- Jean-Baptiste Chapelier, Bono Wasistho and **Carlo Scalo**, *A Coherent vorticity preserving eddy viscosity correction for Large-Eddy Simulation*, Journal of Computational Physics, Vol. 359, pp. 164–182 2018

- Prateek Gupta, Guido Lodato and **Carlo Scalo**, *Spectral Energy Cascade in Thermoacoustic Shock Waves*, Journal of Fluid Mechanics, Vol. 831, pp. 358 – 393 2017

- Iman Rahbari and **Carlo Scalo**, *Linear stability of compressible channel flow over porous walls*, the Whither Turbulence and Big Data in the 21st Century Springer Volume 2016

- Jeffrey Lin, **Carlo Scalo** and Lambertus Hesselink, *High-fidelity simulations of standing-wave piezo-electric thermoacoustic engine*, Journal of Fluid Mechanics, Vol. 808, pp. 19 – 60. 2016

- **Carlo Scalo**, Sanjiva K. Lele and Lambertus Hesselink, *Linear and Nonlinear Modeling of a Traveling-Wave Thermoacoustic Engine*, Journal of Fluid Mechanics, Vol. 766, pp. 368 – 404. 2015

- **Carlo Scalo**, Julien Bodart and Sanjiva K. Lele, *Compressible Channel Flow with Impedance Boundary Conditions*, Physics of Fluids, Vol. 27, 035107. 2015

- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *Self-similar decay and mixing of a high-Schmidt-number passive scalar in a turbulent oscillating boundary layer*, Journal of Fluid Mechanics, Vol. 726, pp. 338–370. 2013

- **Carlo Scalo**, Leon Boegman and Ugo Piomelli, *Large-eddy simulation and low-order modeling of sediment oxygen uptake in a transitional oscillatory flow*, Journal of Geophysical Research-Oceans, Vol. 118, pp. 1–14. 2013

- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *High-Schmidt-number mass transport mechanisms from a turbulent flow to absorbing sediments*, Physics of Fluids 24, 085103. 2012

- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *Large-eddy simulation of oxygen transfer to organic sediment beds*, Journal of Geophysical Research-Oceans, Vol. 117, C06005. 2012

- Geoffrey Lee, **Carlo Scalo** and Ugo Piomelli, *A simple technique for the visualization of eddy kinematics in turbulent flows*, International Journal of Computational Fluid Dynamics, Vol. 26, 4, pp. 263–274. 2012

- Ivan Langella, **Carlo Scalo**, Giuseppe de Felice and Carlo Meola, *Loss of monotonicity and anomalous scaling behavior in the passive scalar gradient: a DNS study on causes of intermittency*, International Journal of Numerical Methods for Heat & Fluid Flow, Vol. 23 Iss: 1, pp. 108 – 123. 2012

- Valerio Grazioso, **Carlo Scalo**, Giuseppe de Felice, Carlo Meola, *High Level Languages Implementation and Analysis of 3D Navier-Stokes Solvers*, Advances in Applied Mathematics and Mechanics, 3, pp. 370-388. 2011

- Ugo Piomelli and **Carlo Scalo**, *SGS modelling in relaminarizing flows*, Fluid Dynamic Research, 42, 45510. 2010

University Research Grants

Transonic Flow Control over Engineered Elastoacoustic Subsurfaces (lead PI: Mostafa Nouh)
Sponsor: Air Force Office of Scientific Research, FA9550-21-S-001
Budget: $341,048 (out of $706,487 total)) **Period:** 09/2023 – 09/2026

Subfilter-scale (SFS) analysis of hypersonic turbulence: a path towards wall-modeled LES
Sponsor: Office of Naval Research, N00014-23-1-2560

Budget: $671,541.21 **Period:** 06/2023 – 05/2026

Discovering Turbulence and Chemistry Interactions in High Speed ReactiveFlows (lead PI: Venkat Raman, U Mich)
Sponsor: Office of Naval Research (FY21 MURI Topic 9), N00014-21-1-2475
Budget: $1M (out of $7,5M total) **Period:** 06/2021 – 05/2026

Reynolds-Averaged Modeling and Real-Gas Effects in Hypersonic Turbulent Boundary Layers (single PI)
Sponsor: Office of Naval Research - Young Investigator Program (ONR-YIP), N000142012662
Budget: $531,250.00 **Period:** 06/2020 – 05/2023

Purdue University / Army Research Lab Cooperative Agreement :: Hypersonics subtask (lead PI: Prof. Jeff Rhoads)
Sponsor: Army Research Labs, Contract No. W911NF202022
Budget: $788.5K (out of $24.7M total)
Period: 03/2020 – 01/2025

High-fidelity Simulation of Detonation Waves in High-Explosives (lead PI: Prof. Steven Son)
Sponsor: Los Alamos National Laboratories - Additively Manufactured Energetic Sensors Project, Grant #14000503
Budget: $329,767 +$80,000 (out of $938K)
Period: 03/2020 – 09/2024

Coherent-vorticity-Preserving (CvP) LES of Very-High-Reynolds-Number Vortex Dynamics (single PI)
Sponsor: Army Research Office - Young Investigator Program (ARO-YIP), W911NF-18-1-0045
Budget: $360,000 (total) **Period:** 01/2018 – 12/2020

DNS of Hypersonic Boundary Layer Transition Over Distributed Surface Porosity (single PI)
Sponsor: Air Force Office of Scientific Research - Young Investigator Program (AFOSR-YIP), FA9550-18- 1-0292
Budget: $450,000 (total) **Period:** 06/2018 – 05/2022

DNS of Hypersonic Transition Control Over Ultrasonically Absorptive Carbon Ceramics (single PI)
Sponsor: Air Force Office of Scientific Research, Core Grant - Award No. FA9550-16-1-0209
Budget: $216,000 (total) **Period:** 06/2016 – 12/2019

Resonating Compressible Turbulence over Porous Surfaces (lead PI)
Sponsor: National Science Foundation (NSF) - Award No. 1706474
Budget: $449,786.82 **Period:** 06/2017 – 05/2020

Nanosecond Repetitively Pulsed (NRP) Plasmas and Relationship With Induced Flow (lead PI: Prof. Sally Bane)
Sponsor: DOE Award No. DE-SC0018156
Budget: $699,415.29 (total: shared by 4 PIs) **Period:** 09/2017 – 08/2020

SBIR/STTR Phases I,II: Multi Time-Scale and Consistent Large Eddy Simulation with Lagrangian Vortex Subgrid Model for Naval Single-Phase and Two-Phase Applications (single PI)
Sponsor: Office of Naval Research, Kord Technologies, Contract No. N68335-15-C-0247
Budget: $241,000 **Period:** 05/2016 – 03/2019

Multi-Fidelity Modeling of Flow Instabilities in Supercritical Flows (lead PI: Prof. Stephen Heister)
Sponsor: Rolls-Royce, Indianapolis **Budget:** $96,000/year (PI-share) **Period:** 01/2016 – 12/2020

High-Pressure Thermoacoustic Waste Heat Reutilization (single PI)
Sponsor: *confidential* **Budget:** $275,000+$225,000 **Period:** 05/2016 – 02/2021

Conference Papers (Refereed)

- Matteo Ruggeri, Gabriel Buginga, Beatrice Bevilacqua, Jincheng Zhou, **Carlo Scalo**,, and Bruno Ribeiro, *Improving GNN Rollouts for CFD Simulation in Unstructured Meshes*, ICML 2025 — May 2025
- Takahiko Toki, Victor C. B. Sousa, Yongkai Chen, Giannino Ponchio Camillo, Alexander Wagner and **Carlo Scalo**, *Large-eddy simulation of a hypersonic turbulent boundary layer over a cone in support of focused laser differential interferometry (FLDI) measurements*, 12th Int. Symposium on Turbulence and Shear Flow Phenomena (Osaka, Japan). — Jul 2022
- Victor C. B. Sousa and **Carlo Scalo**, *The Quasi-Spectral Viscosity (QSV) closure to subfilter-scale fluxes: unifying shock capturing and Large-Eddy Simulation*, 12th Int Symposium on Turbulence and Shear Flow Phenomena (Osaka, Japan) — Jul 2022
- Victor C. B. Sousa, Viola Wartemann, Alexander Wagner and **Carlo Scalo**, *Dynamic QSV-based Large eddy simulation of hypersonic boundary layer transition delay via an impedance boundary*, 11th International Conference on Computational Fluid Dynamics (Maui, HI). — Jul 2022
- Victor C. B. Sousa and **Carlo Scalo**, *A shock capturing subfilter-scale Legendre Spectral Viscosity (LSV) closure applied to high-order flux reconstruction schemes*, 11th International Conference on Computational Fluid Dynamics (Maui, HI). — Jul 2022
- Zongxin Yu, Jean-Baptiste Chapelier and **Carlo Scalo**, *Coherent-Vorticity-Preserving Large-Eddy Simulations (CvP-LES) of High-Reynolds-Number Vortex Dynamics*, 11th International Symposium on Turbulence and Shear Flow Phenomena (Southampton, UK). — July 2019
- Yongkai Chen and **Carlo Scalo**, *Supersonic Turbulent Channel Flow Over Complex Wall Impedance*, 11th International Symposium on Turbulence and Shear Flow Phenomena (Southampton, UK). — July 2019
- Prateek Gupta, **Carlo Scalo**, *Spectral energy cascade in nonlinear acoustic and thermoacoustic waves*, 21st International Symposium on Nonlinear Acoustics (Santa Fe, NM). — July 2018
- Kukjin Kim, **Carlo Scalo** and Jean-Pierre Hickey, *Turbulent dynamics and heat transfer in transcritical channel flow*, 10th International Symposium on Turbulence and Shear Flow Phenomena (Chicago, Illinois). — July 2017
- Brett Meyers, Craig Goergen, **Carlo Scalo** and Pavlos Vlachos *Color Doppler Ultrasound Velocimetry Flow Reconstruction using Streamfunction-Vorticity Formulation*, ASME Summer Bioengineering Conference (Tuscon, Arizona). — June 2017
- Jeffrey Lin, **Carlo Scalo**, Lambertus Hesselink, *High-fidelity simulations of a standing-wave thermoacoustic piezoelectric engine*, The third international workshop on thermoacoustics (Enschede, Netherlands) — Oct. 2015
- **Carlo Scalo**, Sanjiva K. Lele, and Lambertus Hesselink, *Linear and nonlinear modeling of a theoretical traveling-wave thermoacoustic heat engine*, The third international workshop on thermoacoustics (Enschede, Netherlands) — Oct. 2015
- **Carlo Scalo**, Julien Bodart, Iman Rahbari, Sanjiva K. Lele and Laurent Joly, *Near-wall turbulence modification by tuned wall-impedance*, The 9th International Symposium on Turbulence and Shear Flow Phenomena (Melbourne, Australia). — 2015
- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *Large-eddy simulation of oxygen transfer to organic sediment beds*, The 7th International Symposium on Turbulence and Shear Flow Phenomena (Ottawa, Ontario). — 2011
- Ugo Piomelli and **Carlo Scalo**, *Large-eddy simulations of relaminarization due to freestream acceleration*, Seventh IUTAM Symposium on Laminar-Turbulent Transition (Stockholm, Sweden). — 2009
- Valerio Grazioso, Nicola Massarotti, Carlo Meola, **Carlo Scalo**, *A Multilevel Lagrangian Conservative Scheme*, ThermaCOMP09, First International Conference on Computational Methods for Thermal Problems, p. 183-186 (Naples, Italy). — 2009
- Giuseppe de Felice, Valerio Grazioso, Carlo Meola and **Carlo Scalo**, *High Level Languages Implementation and Analysis of 3D Navier-Stokes Solvers*, ThermaCOMP09, First International Conference on Computational Methods for Thermal Problems, p. 203-206, (Naples, Italy). — 2009

Conference Papers (Non-Refereed)

- Forrest, Patel, Austin, Heister, and **Carlo Scalo**, *Observations from testing of Passive Detonation Wave Control Features in Liquid-Liquid Rotating Detonation Combustors*, Joint Army Navy NASA Air Force Journal (JANNAF) — May 2024
- H. Kwon, B. K. Haller, I. V. Walters, C. D. Slabaugh, and **Carlo Scalo**, *StanShockRDE: A Low-order Multi-fidelity Modeling of Rotating Detonation Engine Operability and Wave Dynamics*, Joint Army Navy NASA Air Force Journal — May 2024
- Matteo Ruggeri, B. L. Bemis, Megan C. Sieve, Carson L. Running, J. Luke Hill, Matthew P. Borg, Karl Jantze, and **Carlo Scalo**, *Hypersonic boundary layer treatment with wavy wall*, AIAA Aviation 2024, (Las Vegas, Nevada, USA). — Jul 2024
- Matteo Ruggeri, Victor C. B. Sousa, and **Carlo Scalo**, *Numerical investigation of the Block Spectral Stresses (BSS) method for turbulence modeling and shock-capturing*, 12th International Conference of CFD, (Kobe, Japan). — Jul 2024
- Venkatesh Pulletikurthi, Joel Redmond, Matteo Ruggeri, Carlo Scalo, and Luciano Castillo. "Pressure gradient effects in a turbulence open channel flow subjected to subsonic and transonic Mach numbers," AIAA SciTech 1576 — Jan 2024

- Takahiko Toki, Victor C. B. Sousa, Yongkai Chen and **Carlo Scalo**, *Direct-Numerical and Large-Eddy Simulations of Hypersonic Turbulent Couette Flow at Mach 6, 7 and 8*, AIAA Science and Technology Forum and Exposition 2023 (National Harbor, Maryland). Jan 2023

- Benjamin L. Bemis, John L. Brun, C. Taber Wanstall, J. Luke Hill, Matt P. Borg, Joel J. Redmond, Matteo Ruggeri, Karl Jantze, Carlo Scalo, Carson L. Running, Ultrasonically absorptive silicon-carbide foam for boundary-layer control, AIAA Paper 2023-0096 Jan 2023

- B. L. Bemis, M.C. Sieve, J. L. Hill, M. P. Borg, J. J. Redmond, M. Ruggeri, K. Jantze, **Carlo Scalo**, and C. L. Running, *Effect of Porosity on the Ability of Silicon-Carbide Foams to Attenuate Second-Mode Boundary-Layer Instability*, AIAA Aviation Forum. Jul 2023

- B. L. Bemis, J. L. Brun, C. T. Wanstall, J. L. Hill, M. P. Borg, J. J. Redmond, M. Ruggeri, K. Jantze, **Carlo Scalo**, and C. L. Running, *Ultrasonically Absorptive Silicon-Carbide Foam for Boundary-Layer Control*, AIAA SciTech Forum. Jan 2023

- Joel Redmond, Joseph D. Vasile, and **Carlo Scalo**, *Stability Analysis of Cone and Ogive Geometries at Mach 6: High-Speed Army Reference Vehicle*, JANNAF 17th Modeling and Simulation Subcommittee. May 2023

- Samantha Miller, Karl Jantze, Joel Redmond, **Carlo Scalo**, and Joseph Jewell, *Investigation of Second-Mode Instability Attenuation Over Silicon-Carbide Coated Carbon Foam*, AIAA 2023-4203. AIAA AVIATION 2022 Forum. June 2023

- Samantha Miller, Derek Mamrol, Joel Redmond, Karl Jantze, **Carlo Scalo**, and Joseph Jewell, *High-Speed Boundary Layer Instability on a Flat Plate at Angle of Attack with Porous Walls*. AIAA 2022-0303. AIAA SCITECH 2022 Forum. Jan 2022

- Samantha Miller, Joel Redmond, Karl Jantze, **Carlo Scalo**, and Joseph Jewell, *Investigation of Second-Mode Instability Attenuation Over Porous Materials in Mach-6 Quiet Flow*, AIAA 2022-3530. AIAA AVIATION 2022 Forum. June 2022

- Wesley W. Chapman, Gabriel Montoya, Vaibhav Rajora, Terry R. Salyer, Jeffrey F. Rhoads, **Carlo Scalo**, Steven F. Son, *Effects of embedded additively manufacturable energetic sensors within an RDX-based explosive*, Joint Army Navy NASA Air Force Journal, 2022 Jul 2022

- Nicola Lucarelli, Jean-Baptiste Chapelier, Bono Wasistho, and **Carlo Scalo**, *Development of an Explicitly Filtered Large-Eddy Simulation Framework for the Coherent-vorticity Preserving (CvP) Eddy Viscosity Correction*, AIAA Aviation Forum (virtual). Aug 2021

- Nicola Lucarelli, Xinran Zhao, Robert Morton, William Irvine, and **Carlo Scalo**, *Numerical Investigation of the Stability of Straight Twisted Vortices*, AIAA Aviation Forum (virtual). Aug 2021

- Xinran Zhao and **Carlo Scalo**, *A compact-finite-difference-based numerical framework for adaptive-grid-refinement simulations of vortex-dominated flows*, AIAA SciTech (Orlando, FL). Jan 2020

- Zongxin Yu, Xinran Zhao, Jean-Baptiste Chapelier and **Carlo Scalo** *Coherent-Vorticity-Preserving Large-Eddy Simulations (CvP-LES) of High-Reynolds-Number Vortex Dynamics*, AIAA Aviation (Dallas, TX). Jun 2019

- Victor C. B. Sousa, Viola Wartemann, Alexander Wagner and **Carlo Scalo** *Towards Direct Numerical Simulation of Hypersonic Transition Delay Via Distributed Wall Porosity*, AIAA SciTech (San Diego, CA). Jan 2019

- Jean-Baptiste Chapelier, Bono Wasistho and **Carlo Scalo** *Large-Eddy Simulation of the mutual induction dynamics of double helical vortices*, AIAA Aviation (Atlanta, Georgia). June 2018

- Prateek Gupta, Guido Lodato, **Carlo Scalo**, Kyle Schwinn and Carson Slabaugh, *Detailed chemistry effects on resonating 1D detonation waves in CH_4+O_2 mixture*, AIAA Aviation (Atlanta, Georgia). June 2018

- Victor Sousa, Armani Battista, Joseph Kuehl and **Carlo Scalo**, *Nonlinear Spectral Broadening Dynamics of Second Mode Waves on a Hypersonic Flared Cone*, AIAA Aviation (Atlanta, Georgia). June 2018

- Danish Patel, Prateek Gupta, and **Carlo Scalo**, *Impedance Eduction of Acoustic Liners via the Inverse Helmholtz Solver (iHS) Approach*, AIAA Aviation (Atlanta, Georgia). June 2018

- Mario Tindaro Migliorino, Jean-Baptiste Chapelier, and **Carlo Scalo** *Assessment of spurious numerical oscillations in high-order spectral difference solvers for supercritical flows*, AIAA Aviation (Atlanta, Georgia). June 2018

- Mario Tindaro Migliorino, Dayle Alexander, Stephen Heister, and **Carlo Scalo***A standing-wave transcritical thermoacoustic device: numerical study*, AIAA Aviation (Atlanta, Georgia). June 2018

- Alexander Wagner, Jan Martinez Schramm, Christian Dittert, Victor Sousa, Danish Patel and **Carlo Scalo**, *Experimental and numerical acoustic characterization of ultrasonically absorptive porous materials*, AIAA Aviation (Atlanta, Georgia). June 2018

- Victor C. B. Sousa, J.-B. Chapelier, Danish Patel, Alexander Wagner and **Carlo Scalo**, *Numerical Investigation of Hypersonic Transition Delay over Assigned Wall Impedance on a Sharp Slender Cone*, AIAA SciTech (Kissimmee, Florida). Jan 2018

- Zongxin Yu, Jean-Baptiste Chapelier, and **Carlo Scalo**, *Large-Eddy simulation of knotted vortices*, AIAA SciTech (Kissimmee, Florida). Jan 2018

- Mario Tindaro Migliorino, Prateek Gupta, and **Carlo Scalo**, *Real fluid effects on thermoacoustic standing-wave resonance in supercritical CO_2*, AIAA Aviation (Colorado). June 2017

- Jeffrey Lin, **Carlo Scalo**, and Lambertus Hesselink, *Control of Ultrasonic Thermoacoustic Instability via Axial Modulation of Stack Porosity*, AIAA Aviation (Colorado). Jul. 2017

- Kukjin Kim, Jean-Pierre Hickey and **Carlo Scalo**, *Numerical investigation of transcritical-T heat-and-mass-transfer dynamics in compressible turbulent channel flow*, AIAA SciTech (Grapevine, Texas). Jan. 2017
- Mario Tindaro Migliorino and **Carlo Scalo**, *Dimensionless scaling of heat-release-induced planar shock waves in near-critical CO_2*, AIAA SciTech (Grapevine, Texas). Jan. 2017
- Iman Rahbari and **Carlo Scalo**, *Bi-Global Stability Analysis of Compressible Channel Flow over Complex Impedance Walls*, AIAA SciTech (Grapevine, Texas). Jan. 2017
- Prateek Gupta, Guido Lodato and **Carlo Scalo**, *Numerical Investigation and Modeling of Thermoacoustic Shock Waves*, AIAA SciTech (Grapevine, Texas). Jan. 2017
- Danish Patel, Prateek Gupta, Thomas Rothermel, Markus Kuhn and **Carlo Scalo**, *Impedance Characterization of Ultrasonically Absorptive Coatings via Numerical Solution of the Inverse Helmholtz Problem*, AIAA SciTech (Grapevine, Texas). Jan. 2017
- Danish Patel, Prateek Gupta, and **Carlo Scalo**, *Surface Impedance Determination via Numerical Resolution of the Inverse Helmholtz Problem*, AIAA Aviation (Denver, Colorado). Jun. 2017
- Grigory Shelekhov, Julien Bodart, **Carlo Scalo**, and Laurent Joly, *Separation delay via hydro-acoustic control of a NACA 4412 airfoil in pre-stalled conditions*, AIAA SciTech (Grapevine, Texas). Jan. 2017
- Grigory Shelekhov, Julien Bodart, **Carlo Scalo**, and Laurent Joly, *Coherent structure generation via tuned wall-impedance around a NACA4412 airfoil close to stall conditions*, ECCOMAS. Sept. 2016
- Zhiyan Wang, **Carlo Scalo**, Vinicio Magi, John Abraham, *Towards DNS of Statistically Stationary Turbulent Premixed Flames in Lean Methane/Air Mixtures*, 9^{th} U. S. National Combustion Meeting Organized by the Central States Section of the Combustion Institute (Cincinnati, Ohio). May 2015
- **Carlo Scalo**, Sanjiva K. Lele and Lambertus Hesselink, *Acoustic streaming and its modeling in a traveling-wave thermoacoustic heat engine*, 20th AIAA/CEAS Aeroacoustics Conference (Atlanta, Georgia). June 2014
- **Carlo Scalo**, Sanjiva K. Lele and Lambertus Hesselink, *Numerical investigation of a traveling-wave thermoacoustic heat engine*, Annual Research Briefs, Center for Turbulence Research (Stanford, California). Nov. 2013
- **Carlo Scalo**, Jeffrey Lin, Sanjiva K. Lele and Lambertus Hesselink, *Towards full-scale modeling of a traveling-wave thermoacoustic engine*, AIAA Fluid Dynamics Conference and Exhibit (San Diego, California). June 2013
- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *High-Schmidt-number mass-transfer mechanisms from a turbulent flow to absorbing sediment beds*, 65th Annual Meeting of the Division of Fluid Dynamics of the APS (San Diego, Calfornia). Nov. 2012
- Aidin Jabbari, **Carlo Scalo**, Leon Boegman and Ugo Piomelli, *Oscillating boundary layers in lakes and coastal oceans*, The Int'l Assn. for Great Lakes Research conference (Cornwall, Ontario). May 2012
- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *Mass transport mechanisms at high Schmidt numbers from a turbulent flow to weakly absorbing sediment layers*, The 20th Annual Conference of the CFD Society of Canada (Canmore, Alberta). May 2012
- Ugo Piomelli and **Carlo Scalo**, *Large-eddy simulations of relaminarizing flows*, 17th Annual Conference of the CFD Society of Canada, CFDSC'09 (Ottawa, Ontario). Apr. 2009

Conference Presentations Only (No papers)

- Vaibhav Rajora, Tariq Aslam, Chad Meyer, and **Carlo Scalo**, *Adaptive HP-refinement of Detonation Waves Interacting with Voids in Energetic Materials* , 23rd Biennial Conference of the APS Topical Group on Shock Compression of Condensed Matter (Chicago, Illinois). July 2023
- Xinran Zhao and **Carlo Scalo**, *Direct Numerical Simulation of Trefoil Knotted Vortices*, 71th Annual Meeting of the APS-DFD (Seattle, Washington). Nov 2019
- Jean-Pierre Hickey, Zeping Sun, Matthew Yao, Fan Duosi, Kukjin Kim, and **Carlo Scalo** *Thermal and vortical layers in transcritical wall turbulence*, 71st Annual Meeting of the APS Division of Fluid Dynamics (Atlanta, Georgia) Nov 2018
- Prateek Gupta and **Carlo Scalo**, *Glimpses of Kolmogorov's spectral energy dynamics in nonlinear acoustic waves*, 70th Annual Meeting of the APS-DFD (Denver, Colorado). Nov. 2017
- Victor C. B. Sousa, Danish Patel, Jean-Baptiste Chapelier and **Carlo Scalo**, *Second-mode control in hypersonic boundary layers over assigned wall impedance.*, 70th Annual Meeting of the APS-DFD (Denver, Colorado). Nov. 2017
- Jean-Baptiste Chapelier, Bono Wasistho and **Carlo Scalo**, *Very-high-Reynolds-number vortex dynamics via Coherent-vorticity Preserving (CvP) Large-eddy simulations.*, 70th Annual Meeting of the APS-DFD (Denver, Colorado). Nov. 2017
- Omar Kamal, Jean-Pierre Hickey, and **Carlo Scalo**, *Evolution of solenoidal and dilatational perturbations in transitional supersonic and hypersonic boundary layers.*, 70th Annual Meeting of the APS-DFD (Denver, Colorado). Nov. 2017
- **Carlo Scalo**, Mario Tindaro Migliorino and J.-B. Chapelier, *Numerical simulations of thermoacoustic waves in transcritical fluids employing the spectral difference approach.*, 70th Annual Meeting of the APS-DFD (Denver, Colorado). Nov. 2017

- **Carlo Scalo**, Jeffrey Lin, Sanjiva K. Lele and Lambertus Hesselink, *Full-scale simulation and reduced-order modeling of a thermoacoustic engine*, 66th Annual Meeting of the Division of Fluid Dynamics of the American Physical Society (Pittsburgh, Pennsylvania). Nov. 2013
- **Carlo Scalo**, Jeffrey Lin, Sanjiva K. Lele and Lambertus Hesselink, *A numerical study of thermoacoustic Stirling heat engines*, Thermal & Fluid Sciences Affiliates and Sponsors Conference at Stanford University (Stanford, California). Feb. 2013
- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *High-Schmidt-number mass-transfer mechanisms from a turbulent flow to absorbing sediment beds*, Thousand Islands Fluid Dynamics Meeting (Gananoque, Ontario). Apr. 2012
- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *A study of sedimentary oxygen demand with large-eddy simulation: from largescale hydrodynamics to small-scale mixing*, The 15th International Workshop on Physical Processes in Natural Waters (Burlington, Ontario). May 2011
- Ivan Langella, **Carlo Scalo**, Giuseppe de Felice and Carlo Meola, *On The Small-Scale Anomalies in the Scalar Field in Homogeneous and Isotropic Turbulence*, The 2nd International Conference on Computational Methods for Thermal Problems (Dalian, China). Sept 2011
- **Carlo Scalo**, Ugo Piomelli and Leon Boegman, *Large-eddy simulation of oxygen transfer to organic sediment beds*. 63rd Annual Meeting of the Division of Fluid Dynamics of the American Physical Society (Long Beach, California) Nov 2010
- **Carlo Scalo** and Ugo Piomelli, *Grid requirements for large-eddy simulations of scalar transport at high Prandtl numbers*, 18th Annual Conference of the CFD Society of Canada (London, Ontario). Apr 2010
- **Carlo Scalo**, Danish Patel, and Prateek Gupta, *Acoustic impedance characterization via numerical resolution of the inverse Helmholtz problem*, 69th Annual Meeting of the APS-DFD (Portland, Oregon). Nov 2016
- Nina Beigzali, Yingming Zhao, Josef Ackerman, **Carlo Scalo**, and Leon Boegman, *Sediment oxygen demand simulation in Lake Erie*, The Int'l Assn. for Great Lakes Research conference (San Diego, California). Sept 2016
- **Carlo Scalo**, and Iman Rahbari, *Hydro-acoustic instabilities in compressible turbulent boundary layers*, 68th Annual Meeting of the APS-DFD (Boston, Massachusetts). Nov 2015
- **Carlo Scalo**, Julien Bodart and Sanjiva K. Lele, *Compressible Channel Flow with Impedance Boundary Conditions*, 67th Annual Meeting of the APS-DFD (San Francisco, California). Nov 2014
- Jeffrey Lin, **Carlo Scalo**, Lambertus Hesselink, *High-fidelity simulations of a standing-wave thermoacoustic piezoelectric engine*, 67th Annual Meeting of the APS-DFD (San Francisco, CA). Nov 2014
- Ludovic Lelostec, **Carlo Scalo**, Sanjiva K. Lele, *Sound-turbulence interaction in transonic boundary layers*, 67th Annual Meeting of the APS-DFD (San Francisco, CA). Nov 2014
- **Carlo Scalo**, Sanjiva K. Lele, *Nonlinear effects in thermoacoustic engines*, The Thermal & Fluid Sciences Affiliates and Sponsors Conference at Stanford University (Stanford, California). Feb 2014

Invited Seminars/Talks

- *Large-Eddy Simulations of High-Speed Turbulence*, Center for Hypersonic University of Queensland, Australia Mar 2024
- *Passive Control of Hypersonic Boundary Layer Instabilities*, NASA Langley, VA Jan 2023
- *Passive Control Strategies of RDEs and application to Scramjet/Ramjet Instabilities*, NASA Langley, VA Jan 2023
- *Mixing Study in RDRE-based Combined Cycle Systems*, NASA Langley, VA Jan 2023
- *Coherent-vorticity-Preserving LES of Very-High Reynolds Number Vortex-Dominated Flows*, U. Conneticut Mar 2021
- *Coherent-vorticity-Preserving LES of Very-High Reynolds Number Vortex-Dominated Flows*, NASA Langley, VA Mar 2021
- *SGS and AMR techniques for high-Reynolds-number vortex-dominated flows*, Los Alamos National Labs, NM Oct 2019
- *Large-Eddy and Direct-Numerical Simulation of Vortex-Dominated and Hypersonic Flows*, High-Performance Computing Workshop, Purdue University, West Lafayette, IN. Mar 2019
- *Coherent-Vorticity-Preserving (CvP) Large-Eddy Simulations (LES) of High-Reynolds-Number Vortex Dynamics*, Theoretical Fluid Dynamic Conference, AIAA AVIATION Forum, Dallas, TX, USA June 2019
- *Compressible Turbulent Flow over Wall Impedance*, the Whither Turbulence and Big Data in the 21st Century Meeting, Corsica, France. Aug. 2016
- *Passive Control of Multimode Instabilities in Hypersonic Boundary Layers*, Air Force Institute of Technology, Dayton, OH June 2019
- *Large-Eddy and Direct-Numerical Simulations of Vortex-Dominated and Transitional Hypersonic Flows*, Florida State University, Tallahassee, FL Sept 2018
- *Direct Numerical Simulations of Hypersonic Transition Delay Over Complex Wall Impedance*, l'Institut Supérieur de l'Aéronautique et de l'Espace, SUPAERO (Toulouse, France) Mar 2018
- *Glimpses of Kolmogorov's Theory in Nonlinear Acoustic, Thermoacoustic and Detonation Waves*, Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique, CERFACS (Toulouse, France) Mar 2018

- *Low-speed and high-speed boundary layer control over complex wall impedance*, Seminar Series, University of Alabama in Huntsville (Huntsville, Alabama). Dec 2017
- *Kolmogorov's Spectral Energy Dynamics in Thermoacoustic Turbulence*, Applied Math Seminar Series, Purdue University (West Lafayette, Indiana). Sept 2017
- *Resonant mode control from transonic to hypersonic boundary layers over complex wall impedance*, NASA Ames Research Center, Moffett Field, CA Aug 2017
- *Resonant mode control in compressible boundary layers over complex wall impedance*, Seminar Series, University of Minnesota (Minneapolis, Minnesota). Mar 2017
- *Large-Eddy Simulation and Modelling of Oxygen Transport and Depletion in Water Bodies*, Seminar Series, Purdue University, Department of Civil Engineering, (West Lafayette, Indiana) Feb 2017
- *Kolmogorov's Spectral Energy Dynamics in Thermoacoustic Turbulence*, Seminar Series, University of Cambridge, (Cambridge, UK) Jan 2017
- *Hydro-acoustic instabilities in compressible turbulent boundary layers*, l'Institut Supérieur de l'Aéronautique et de l'Espace, SUPAERO (Toulouse, France) Sept 2015
- *Theoretical and numerical modeling of thermoacoustic energy conversion systems*, Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique, CERFACS (Toulouse, France) Sept 2015
- *Compressible boundary layers over acoustically resonant porous surfaces*, German Aerospace Center (DLR) (Göttinghen, Germany) Aug 2015
- *Hydro-acoustic instabilities in compressible turbulent boundary layers*, Whither Turbulence and Big Data in the 21st Century – in honour Prof. Bill George 70th birthday (Cargèse, France) April 2015
- *Theoretical and numerical modeling of thermoacoustic energy conversion systems*, Cooling Technologies Research Center, Purdue University (West Lafayette, Indiana) Dec 2014