

Aaron S. Towne

Assistant Professor • Mechanical Engineering • University of Michigan
Lay Automotive Engineering Laboratory • 1231 Beal Ave. • Ann Arbor, MI 48109
(734) 647-5278 • town@umich.edu • www.atowne.com

EDUCATION

California Institute of Technology – Ph.D. Mechanical Engineering

June 2016

Thesis committee: Tim Colonius, Fazle Hussain, Beverley McKeon, Guillaume Blanquart

California Institute of Technology – M.S. Mechanical Engineering

June 2010

University of Wisconsin-Madison – B.S. Engineering Mechanics

May 2009

Graduated with Highest Distinction

POSITIONS

University of Michigan, Department of Mechanical Engineering – Assistant Professor

September 2018 - present

Center for Turbulence Research, Stanford University – Postdoctoral Fellow

February 2016 – July 2018

Supervisors: Sanjiva K. Lele, Parviz Moin, Gianluca Iaccarino

Topics: low-order modeling of turbulent flows, statistical jet noise models, uncertainty quantification

Cascade Technologies, Inc. – Research Consultant

Palo Alto, CA, February 2017 – January 2018 (part-time)

Project managers: Guillaume A. Brès, Gianluca Iaccarino

Topics: online data analysis, jet thrust computation and optimization

California Institute of Technology – Graduate Research Assistant

Computational Flow Physics Group, 2009-2015

Advisor: Tim Colonius

Topics: fast solution methods for linear PDEs via spatial marching, jet turbulence and noise analysis and modeling, acoustic resonance in subsonic jets, supersonic jet noise control

University of Wisconsin-Madison – Undergraduate Research Assistant

Engineering Physics Department, 2008-2009

Supervisors: Michael Corradini, Mark Anderson

Topics: supercritical flows in advanced heat exchangers

TEACHING

University of Michigan – Instructor

Fluid Mechanics I (ME 320), *Winter 2020, Winter 2021, Fall 2021, Winter 2023, Winter 2024*

Advanced Fluid Mechanics I (ME 520), *Fall 2018, Fall 2019, Fall 2020, Fall 2022, Fall 2023*

Hydrodynamic Stability (ME 623), *Winter 2022*

California Institute of Technology – Teaching Assistant
Computational Fluid Dynamics, 2012

University of Wisconsin-Madison

Aerodynamics (*Teaching Assistant / Grader*), 2008

Dynamics, Mechanics of Materials, and Mechanical Vibrations (*Tutor, Undergraduate Learning Center*), 2007-2008

HONORS & AWARDS

- Office of Naval Research (ONR) Young Investigator Program (YIP) Award, 2024
- National Science Foundation (NSF) CAREER Award, 2022
- Google Scholar Metrics 2022: authored the most cited article in *J. Fluid Mech.* since 2017 (Towne et al., “Spectral proper orthogonal decomposition and its relationship to dynamic mode decomposition and resolvent analysis.”)
- Air Force Office of Scientific Research (AFOSR) Young Investigator Program (YIP) Award, 2020
- ASME Wind Energy Symposium Best Paper Award (coauthor), 2018
- Center for Turbulence Research Postdoctoral Fellowship, 2016
- AIAA/CEAS Aeroacoustics Best Student Paper Award, 2016
- California Institute of Technology Graduate Research Fellowship, 2009-2010
- Graduated with Highest Distinction, University of Wisconsin-Madison, 2009
- University of Wisconsin-Madison Engineering Physics merit-based scholarships, 2006-2008
- University of Wisconsin-Madison Dean’s List Honoree, every semester 2004-2009

ACADEMIC SERVICE & MEMBERSHIPS

- **Professional Committees**
 - APS-DFD Acrivos Award committee (2023-2024)
 - AIAA Fluid Dynamics Technical Committee (2020-2024)
 - Co-chair of the AIAA Discussion Group on Reduced-complexity Modeling of Fluid Flow (2021-2024)
- **Conference Organization**
 - Fluid Dynamics Technical Discipline Chair, AIAA SciTech Forum (2023)
 - Fluid Dynamics Technical Discipline Co-Chair, AIAA SciTech Forum (2022)
 - Organized mini-symposium on “Reduced-order modeling and analysis of turbulence”, SIAM Conference on Computational Science & Engineering (2021)
 - Associate Organizer, Fluid Dynamics Conference, AIAA SciTech Forum (2021)
- **Journal Referee**
 - *Journal of Fluid Mechanics*
 - *Journal of Computational Physics*
 - *Communications Physics*
 - *Physical Review Fluids*
 - *Physical Review E*
 - *Physics of Fluids*
 - *Theoretical & Computational Fluid Mechanics*
 - *Computers & Fluids*
 - *Experiments in Fluids*
 - *Shock Waves*
 - *International Journal of Heat and Mass Transfer*
 - *AIAA Journal*

- *Proceedings of the Royal Society A*
 - *European Journal of Mechanics - B*
 - *Journal of Sound and Vibration*
 - *Journal of the Acoustical Society of America*
 - *International Journal of Aeroacoustics*
 - *SIAM/ASA Journal on Uncertainty Quantification*
 - *Engineering Structures*
 - *C.R. Mecanique*
- **Proposal Reviewer**
 - German Research Foundation (2023)
 - Army Research Office (ARO) Fluid Dynamics program (2019, 2020, 2023)
 - NSF Fluid Dynamics Review Panel (2019, 2022)
 - DOE Advanced Scientific Computing Research Program (2022)
 - European Research Council (ERC), Physical Sciences and Engineering (2022)
 - UK Engineering and Physical Sciences Research Council (2022)
 - The Leverhulme Trust (2021)
 - **Abstract Reviewer**
 - AIAA Fluid Dynamics Conference (2020, 2024)
 - AIAA SciTech Forum and Exposition (2019)
 - ONR Symposium on Naval Hydrodynamics (2018)
 - AIAA Aeroacoustics Conference (2017)
 - Center for Turbulence Research Summer Program (2016, 2018)
 - **Judge**
 - APS-DFD Student Poster Competition (2022)
 - Michigan Engineering Research Symposium (2019, 2021)
 - Stanford MECON poster competition (2016)
 - **Member**
 - American Institute of Aeronautics and Astronautics (AIAA)
 - American Physical Society (APS)
 - Acoustical Society of America (ASA)
 - Society for Industrial and Applied Mathematics (SIAM)
 - American Society of Mechanical Engineers (ASME)

PUBLICATIONS

Peer-reviewed journal articles

- [1] **Farghadan, A., Jung, J., Bhagwat, R., Towne, A.** (2024). Efficient harmonic resolvent analysis via time-stepping. *Theoretical and Computational Fluid Dynamics*.
- [2] Wadas, M.J., White, W.J., LeFevre, H.J., Kuranz, C.C., **Towne, A.**, Johnsen, E. (2024). Hydrodynamic Mechanism for Clumping along the Equatorial Rings of SN1987A and Other Stars. *Physical Review Letters*, 132, 111201.
- [3] **Frame, P., Towne, A.** (2024). Beyond optimal disturbances: a statistical framework for transient growth. *Journal of Fluid Mechanics*, 983, A2.

- [4] Wadas, M., Balakrishna, S., LeFevre, H., Kuranz, C., **Towne, A.**, Johnsen, E. (2024). On the stability of a pair of vortex rings. *Journal of Fluid Mechanics*, 979, A3.
- [5] **Frame, P. Towne, A.** (2023). Space-time POD and the Hankel matrix. *PLoS ONE* 18(8): e0289637.
- [6] **Towne, A.**, Dawson, S.T.M., Brès, G.A, Lozano-Durán, A., Saxton-Fox, T., Parthasarathy, A., Jones, A.R., Biler, H., Yeh, C.-A. Patel, H.D., Taira, K. (2023). A Database for Reduced-Complexity Modeling of Fluid Flows. *AIAA Journal*, 61 (7), 2867-2892.
- [7] Wong, T.Y.M., Stavropoulos, M.N., Beekman, J.R., **Towne, A.**, Nogueira, P.A.S., Edgington-Mitchell, D. (2023). Steady and unsteady coupling in twin weakly underexpanded round jets. *Journal of Fluid Mechanics*, 964, A2.
- [8] Karban, U., Bugeat, B., **Towne, A.**, Lesshafft, L., Agarwal, A., Jordan, P. (2023). An empirical model of noise sources in subsonic jets. *Journal of Fluid Mechanics*, 965, A18.
- [9] Mancinelli, M., Martini, E., Jaunet, V., Jordan, P., **Towne, A.**, Gervais Y. (2023). Reflection and transmission of a Kelvin-Helmholtz wave incident on a shock in a jet. *Journal of Fluid Mechanics*, 954, A9.
- [10] **Zhu, M., Towne, A.** (2022). Recursive one-way Navier Stokes equations with PSE-like cost. *Journal of Computational Physics*, 473, 111744.
- [11] Karban, U., Martini, E., Jordan, P., Brès, G.A., **Towne, A.** (2022). Solutions to aliasing in time-resolved flow data. *Theoretical and Computational Fluid Dynamics*, Vol. 36, pp 887–914.
- [12] **Towne, A.**, Rigas, G., Kamal, O., Pickering, E., Colonius, T. (2022). Efficient global resolvent analysis via the one-way Navier–Stokes equations. *Journal of Fluid Mechanics*, 948, A9.
- [13] Thoene, J., Gavin, R.F., **Towne, A.**, Wattay, L., Ferrari, M.G., Navarrete, J., Pal R. (2022). In vitro activity of cysteamine against SARS-CoV-2 variants. *Molecular Genetics and Metabolism*, 137, 192-200.
- [14] Nogueira, P., Self, H. W. A., Towne, A., Edgington-Mitchell, D. (2022). Wavepacket modulation in shock-containing jets. *Physical Review Fluids*, 7, 074608.
- [15] Martini, E., **Jung, J.**, Cavalieri, A.V.G., Jordan, P., **Towne, A.** (2022). Resolvent-based tools for optimal estimation and control via the Wiener-Hopf formalism. *Journal of Fluid Mechanics*, 937, A19.
- [16] Pickering, E., **Towne, A.**, Jordan, P., Colonius, T. (2021). Resolvent-based modeling of turbulent jet noise. *Journal of the Acoustical Society of America*, 150 (4), 2421-2433.
- [17] Nogueira, P., Jordan, P., Jaunet, V., Cavalieri, A., **Towne, A.**, Edgington-Mitchell, D. (2021). Absolute instability in shock-containing jets. *Journal of Fluid Mechanics*, 930, A10.
- [18] Mancinelli, M., Jaunet, V., Jordan, P., **Towne, A.** (2021). A complex-valued resonance model for axisymmetric screech tones in supersonic jets. *Journal of Fluid Mechanics*, 928, A32.
- [19] Amaral, F., Cavalieri, A., Martini, E., Jordan, P., & **Towne, A.** (2021). Resolvent-based estimation of turbulent channel flow using wall measurements. *Journal of Fluid Mechanics*, 927, A17.
- [20] **Chen, Z., Towne, A.** (2021). An azimuthal Fourier domain formulation of the Ffowcs-Williams and Hawkings equation. *Journal of the Acoustical Society of America*, 150 (3), 1967-1978.
- [21] Martini, E., Rodriguez, D., **Towne, A.**, Cavalieri, A. (2021). Efficient computation of global resolvent modes. *Journal of Fluid Mechanics*, Vol. 919, A3.

- [22] Edgington-Mitchell, D., **Wang, T.**, Nogueira, P., Schmidt, O.T., Jaunet, V., Duke, D., Jordan, P., **Towne, A.** (2021). Waves in screeching jets. *Journal of Fluid Mechanics*, Vol. 913, A7.
- [23] Antonialli, L.A., Cavalieri, A. V. G., Schmidt, O. T., Colonius, T., Jordan, P., **Towne, A.**, Brès, G. A. (2020). Amplitude Scaling of Wave Packets in Turbulent Jets. *AIAA Journal*, Vol. 59(2), 559-568.
- [24] Martini, E., Cavalieri, A. V. G., Jordan, P., **Towne, A.**, Lesshafft, L. (2020). Resolvent-based optimal estimation of transitional and turbulent flows. *Journal of Fluid Mechanics*, Vol. 900, A2.
- [25] Karban, U., Bugeat, B., Martini, E., **Towne, A.**, Cavalieri, A. V. G., Lesshafft, L., Agarwal, A., Jordan, P., Colonius, T. (2020). Ambiguity in mean-flow-based linear analysis. *Journal of Fluid Mechanics*, Vol. 900, R5.
- [26] Xu, H. H. A., **Towne, A.**, Yang, X. I. A., Marusic, I. (2020). Pressure power spectrum in high-Reynolds number wall-bounded flows. *International Journal of Heat and Fluid Flow*, Vol. 84, 108620.
- [27] Ghate, A., **Towne, A.**, Lele, S. K. (2020). Broadband reconstruction of inhomogeneous turbulence using spectral proper orthogonal decomposition and Gabor modes. *Journal of Fluid Mechanics*, Vol. 888, R1.
- [28] **Towne, A.**, Lozano-Durán, A., Yang, X. (2020). Resolvent-based estimation of space-time flow statistics. *Journal of Fluid Mechanics*, Vol. 883, A17.
- [29] **Towne, A.**, Rigas, G., Colonius, T. (2019). A critical assessment of the parabolized stability equations. *Theoretical and Computational Fluid Dynamics*, Vol. 33, pp 359-382.
- [30] Mancinelli, M., Jaunet, V., Jordan, P., **Towne, A.** (2019). Screech-tone prediction using upstream-travelling jet modes. *Experiments in Fluids*, Vol. 60:22.
- [31] Schmidt, O.T. and **Towne, A.** (2019). An efficient streaming algorithm for spectral proper orthogonal decomposition. *Computer Physics Communications*, Vol. 237, pp 89-109.
- [32] Sanjose, M., **Towne, A.**, Jaiswal, P., Moreau, S., Lele, S. K., and Mann, A. (2019). Modal analysis of the laminar boundary layer instability and tonal noise of an airfoil Reynolds number 150,000. *International Journal of Aeroacoustics*, Vol. 18, pp. 317-350.
- [33] Edgington-Mitchell, D., Jaunet, V., Jordan, P., **Towne, A.**, Soria, J., and Honnery, D. (2018). Upstream-travelling acoustic jet modes as a closure mechanism for screech. *Journal of Fluid Mechanics (Rapids)*, Vol. 855-R1.
- [34] Schmidt, O. T., **Towne, A.**, Rigas, G., Colonius, T. and Brès, G. A. (2018). Spectral analysis of jet turbulence. *Journal of Fluid Mechanics*, Vol. 855, pp. 953-982.
- [35] Jordan, P., Jaunet, V., **Towne, A.**, Cavalieri, A. V. G., Colonius, T., Schmidt, O. T., and Agarwal A. (2018). Jet-flap interaction tones. *Journal of Fluid Mechanics*, Vol. 853, pp. 333-358.
- [36] Brès, G. A., Jordan, P., Le Rallic, M., Jaunet, V., Cavalieri, A. V. G., **Towne, A.**, Lele, S. K., Colonius, T., and Schmidt, O. T. (2018). Importance of the nozzle-exit boundary-layer state in subsonic turbulent jets. *Journal of Fluid Mechanics*, Vol. 851, pp. 83-124.
- [37] **Towne, A.**, Schmidt, O. T., Colonius, T. (2018). Spectral proper orthogonal decomposition and its relationship to dynamic mode decomposition and resolvent analysis. *Journal of Fluid Mechanics*, Vol. 847, pp. 821-867.
- [38] Sinha, A., **Towne, A.**, Colonius, T., Schlinker, R. H., Reba, R., Simonich, J. S., Shannon, D. W. and Teerlinck, K.A. (2018). Active control of noise from hot supersonic jets. *AIAA Journal*, Vol. 56, No. 3, pp. 933-948.

- [39] **Towne, A.**, Cavalieri, A. V. G., Jordan, P., Colonius, T., Jaunet, V., Schmidt, O.T., and Brès, G. A. (2017). Acoustic resonance in the potential core of subsonic jets. *Journal of Fluid Mechanics*, Vol. 825, pp. 1113—1152.
- [40] Schmidt, O. T., **Towne, A.**, Colonius, T., Cavalieri, A. V. G., Jordan, P. and Brès, G. A. (2017). Wavepackets and trapped acoustic modes in a Mach 0.9 turbulent jet: a global stability analysis. *Journal of Fluid Mechanics*, Vol. 825, pp. 1153—1181.
- [41] **Towne, A.** and Colonius, T. (2015). One-way spatial integration of hyperbolic equations. *Journal of Computational Physics*, Vol. 300, pp 844-861.
- [42] Kruijenga, A., Anderson, M., Fatima, R., Corradini, M., **Towne, A.**, Ranjan, D. (2011). Heat transfer of supercritical carbon dioxide in printed circuit heat exchanger geometries. *Journal of Thermal Science and Engineering Applications*, Vol. 3.

Refereed conference papers & refereed technical reports (full-length papers)

- [43] **Towne, A.**, **Bhagwat, R.**, **Zhou, Y.**, **Jung, J.**, Martini, E., Jordan, P., Audiffred, D., Maia, I., Cavalieri, A. (2024). Resolvent-Based Estimation of Wavepackets in Turbulent Jets. *AIAA Paper #2024-3413*.
- [44] Nogueira, P., Cavalieri, A., Martini, E., **Towne, A.**, Jordan, P., Edgington-Mitchell, D. (2024). On the generation and propagation of guided jet waves. *AIAA Paper #2024-3201*.
- [45] **Jung, J.**, **Towne, A.** (2024). Toward turbulent wake estimation using a resolvent-based approach. *AIAA Paper #2024-0057*.
- [46] **Jung, J.**, **Bhagwat, R.**, **Towne, A.** (2023). Resolvent-based estimation of laminar flow around an airfoil. *AIAA Paper 2023-0077*.
- [47] **Farghadan, A.**, **Towne, A.**, Martini, E., Cavalieri A. (2021). A randomized time-domain algorithm for efficiently computing resolvent modes. *AIAA Paper 2021-2896*.
- [48] **Towne, A.** (2021). Space-time Galerkin projection via spectral proper orthogonal decomposition and resolvent modes. *AIAA Paper #2021-1676*.
- [49] Pickering, E., Colonius, T., Jordan, P., **Towne, A.** (2020). Resolvent-based jet noise models: a projection approach. *AIAA Paper 2020-0999*.
- [50] **Towne, A.**, Schmidt, O. T., Brès, G. A. (2019). An investigation of the Mach number dependence of trapped acoustic waves in turbulent jets. *AIAA Paper 2019-2546*.
- [51] Maia, I., Jordan, P., Martini, E., Cavalieri, A. V. G., **Towne, A.**, Lesshafft, L., Schmidt, O. (2019). Real-time estimation of flow disturbances in a turbulent jet using multiple-input, multiple-output transfer functions. *AIAA Paper 2019-2535*.
- [52] Brès, G. A., **Towne, A.**, Lele, S. K. (2019). Investigating the effects of temperature non-uniformity on supersonic jet noise with large-eddy simulation. *AIAA Paper 2019-2730*.
- [53] Edgington-Mitchell, D., Duke, D., Harris, D., Wang, T., Schmidt, O., Jaunet, V., Jordan, P., **Towne, A.** (2019). Modulation of downstream-propagating waves in jet screech. *AIAA Paper 2019-2689*.

- [54] Jaunet, V., Mancinelli, M., Jordan, P., **Towne, A.**, Edgington-Mitchell, D. Lehnasch, G., Girard, S. (2019). Dynamics of round jet impingement. *AIAA Paper 2019-2769*.
- [55] Mancinelli, M., Jaunet, V., Jordan, P., **Towne, A.**, Girard, S. (2019). Reflection coefficients and screech-tone prediction in supersonic jets. *AIAA Paper 2019-2522*.
- [56] Schmidt, O. T., Schmid, P. J., **Towne, A.**, Lele, S. K. (2018). Statistical description of intermittency and rare events via conditional space-time POD: Example of acoustic bursts in turbulent jets. *Annual Research Briefs*, Center for Turbulence Research, Stanford University.
- [57] Wang, Z.-N. Chandramoorthy, N., Tucker, P. G., Wang, Q., **Towne, A.**, Lele, S. K. (2018). Lyapunov stability analysis of nonlinear dynamics of sound generation in a mixing layer. *Annual Research Briefs*, Center for Turbulence Research, Stanford University.
- [58] Schmid, P. J., Schmidt, O. T., **Towne, A.**, Hack, M. J. P. (2018). Analysis and prediction of rare events in turbulent flows. *Proceedings of the Summer Program*, Center for Turbulence Research, Stanford University.
- [59] Bodony, D. J., Sashittal., P., **Towne, A.** (2018). Low-rank modeling of primary atomization. *Proceedings of the Summer Program*, Center for Turbulence Research, Stanford University.
- [60] Blonigan, P.J., Murman, S.M., **Towne, A.** (2018). Reducing the cost of shadowing-based adjoint sensitivity analysis for turbulent flows. *Proceedings of the Summer Program*, Center for Turbulence Research, Stanford University.
- [61] **Towne, A.**, Yang, X., Lozano-Durán, A. (2018). Approximating space-time flow statistics from a limited set of known correlations. *AIAA Paper 2018-4043*.
- [62] Antonialli, L. A., Cavalieri, A. V. G., Schmidt, O. T., Colonius, T., Jordan, P., **Towne, A.**, Brès, G. A. (2018). Amplitude scaling of turbulent-jet wavepackets. *AIAA Paper 2018-2978*.
- [63] Ghate, A., Ghaisas, A., **Towne, A.**, Lele, S. K. (2018). Interaction of small scale Homogenous Isotropic Turbulence with an Actuator Disk. *AIAA Paper 2018-0753*. **(Best paper award winner)**
- [64] del Rosario, Z., **Towne, A.**, Iaccarino, G. (2018). Dimension reduction for shape design insight. *AIAA Paper 2018-0274*.
- [65] **Towne, A.** (2017). Completing partially known space-time flow statistics: a resolvent-based approach. *Annual Research Briefs*, Center for Turbulence Research, Stanford University.
- [66] **Towne, A.**, Brès, G. A. and Lele, S. K. (2017). A statistical jet-noise model based on the resolvent framework. *AIAA Paper 2017-3706*.
- [67] Sanjose, M., Jaiswal, P., Arroyo, C.P., Moreau, S., **Towne, A.**, Lele, S. K. and Mann, A. (2017). Direct numerical simulation of laminar boundary layer instability noise. *AIAA Paper 2017-3190*.
- [68] **Towne, A.**, Brès, G. A. and Lele, S. K. (2016). Toward a resolvent-based statistical jet-noise model. *Annual Research Briefs*, Center for Turbulence Research, Stanford University.
- [69] Rosenberg, K., Saxton-Foxz, T., Lozano-Duran, A., **Towne, A.**, and McKeon, B. J. (2016). Towards low order models of wall turbulence using resolvent analysis. *Proceedings of the Summer Program*, Center for Turbulence Research, Stanford University.
- [70] Sanjose, M., Jaiswal, P., Moreau, S., **Towne, A.** and Lele, S. K. (2016). Laminar boundary layer instability noise. *Proceedings of the Summer Program*, Center for Turbulence Research, Stanford University.

- [71] Afsar, M. Z., Sescuz, A., Sassanis, V., **Towne, A.**, Brès, G. A. and Lele S. K. (2016). Prediction of supersonic jet noise using non-parallel flow asymptotics and LES data within Goldstein's acoustic analogy. *Proceedings of the Summer Program*, Center for Turbulence Research, Stanford University.
- [72] **Towne, A.**, Cavalieri, A. V. G., Jordan, P., Colonius, T., Jaunet, V., Schmidt, O. T., and Brès, G. A. (2016). Trapped acoustic waves in the potential core of subsonic jets. *AIAA Paper 2016-2809*. **(Best paper award winner)**
- [73] Schmidt, O. T., **Towne, A.**, Colonius, T., Jordan, P., Jaunet, V., Cavalieri, A. V. G., and Brès, G. A. (2016). Super- and multi-directive acoustic radiation by linear global modes of a turbulent jet. *AIAA Paper 2016-2808*.
- [74] Jaunet, V., Jordan, P., Cavalieri, A. V. G., **Towne, A.**, Colonius, T., Schmidt, O. T., and Brès, G. A. (2016). Tonal dynamics and sound in free and installed turbulent jets. *AIAA Paper 2016-3016*.
- [75] Brès, G. A., Jaunet, V., Le Rallic, M., Jordan, P., **Towne, A.**, Schmidt, O. T., Colonius, T., Cavalieri, A. V. G. and Lele, S. K. (2016). Large eddy simulation for jet noise: azimuthal decomposition and intermittency of the radiated sound. *AIAA Paper 2016-3050*.
- [76] **Towne, A.**, Colonius, T., Jordan, P., Cavalieri, A.V.G., Brès, G. A. (2015). Stochastic and nonlinear forcing of wavepackets in a Mach 0.9 jet. *AIAA Paper 2015-2217*.
- [77] Colonius, T., Sinha, A., Rodríguez, D., **Towne, A.**, Liu, J., Brès, G. A., Appelö, D., and Hagstrom, T. (2015). Simulation and modeling of turbulent jet noise, *Direct and Large-Eddy Simulation IX*
- [78] Jordan, P., Colonius, T., Brès, G. A., Zhang, M., **Towne, A.**, and Lele, S. K. (2014). Modeling intermittent wavepackets and their radiated sound in a turbulent jet. *Proceedings of the Summer Program*, Center for Turbulence Research, Stanford University.
- [79] **Towne, A.** and Colonius, T. (2014). Continued development of the one-way Euler equations: application to jets. *AIAA Paper 2014-2903*.
- [80] **Towne, A.** and Colonius, T. (2013). Improved parabolization of the Euler equations. *AIAA Paper 2013-2171*.

PRESENTATIONS (lead-author only)

Invited

- [1] “Advances in resolvent-based modeling of turbulent flows”. *Advanced Modeling & Simulation (AMS) Seminar*, NASA Ames Research Center. 5 October 2023.
- [2] “Three advances in non-modal stability theory for transitional and turbulent flows”. *Department of Computational Mathematics, Science, and Engineering Colloquium*, Michigan State University. 3 April 2023.
- [3] “Advances in non-modal hydrodynamic stability theory”. *GALCIT Colloquium*, California Institute of Technology. 24 February 2023.
- [4] “Resolvent-based estimation and control of turbulent flows”. *Aerospace Chairs Distinguished Seminar Series*, University of Michigan. 19 January 2023.

- [5] “Resolvent-based optimal estimation and control of turbulent flows”. Illinois Institute of Technology, Mechanical, Materials, and Aerospace Engineering Seminar. 2 November 2022.
- [6] “Aeroacoustic Noise Control.” *Applied Physics Seminar*, University of Michigan. 21 September 2022.
- [7] “Introduction to a database for testing reduced-complexity modeling methods in fluids.” *AIAA Aviation Forum*. 27 June – 1 July 2022. Chicago, IL.
- [8] “Time-delay embedding and space-time POD”. *National Congress on Theoretical and Applied Mechanics (USNC/TAM)*. 20-24 June 2022. Austin, TX.
- [9] “Resolvent-based optimal estimation and control of turbulent flows”. Isaac Newton Institute, *Workshop on Wall-bounded turbulence: beyond current boundaries*. 28 March 2022. University of Cambridge, UK.
- [10] “Resolvent-based estimation and control”. *Workshop of the USP Aerospace Center of Brazil*. 12 November 2021. Virtual.
- [11] “Advances in resolvent-based modeling of turbulent flows”. University of Illinois Urbana-Champaign, Aerospace Seminar. 20 September 2021.
- [12] “Space-Time Reduced-Order Models using Spectral Proper Orthogonal Decomposition”. *SIAM Conference on Computational Science and Engineering*. 1-5 March 2021. Virtual.
- [13] “Resolvent-based optimal estimation and control of turbulent flows”. Ohio State University, Aerospace Seminar. 26 February 2021. Virtual.
- [14] “Trapped acoustic waves underpin tonal components of jet noise”. *NASA Glenn Research Center*. 28 February 2020. Cleveland, OH.
- [15] “Finding order in chaos: Identifying and modeling coherent structures in turbulent flows”. *Applied Physics Seminar*, University of Michigan. 23 October 2019. Ann Arbor, MI.
- [16] “Resolvent-based estimation for flow control”. *49th AIAA Fluid Dynamics Conference*. 17-21 June 2019. Dallas, TX.
- [17] “Time-frequency analysis of wavepackets”. *International Wavepacket Symposium*. 28-30 May 2019. Poitiers, France.
- [18] “Identifying and Modeling Coherent Structures in Turbulent Flows Using Spectral Proper Orthogonal Decomposition and Resolvent Analysis”. *SIAM Conference on Computational Science and Engineering*. 25 February – 1 March 2019. Spokane, WA.
- [19] “Identifying and leveraging coherent structures in turbulent jets”. *University of Michigan, Department of Mechanical Engineering*. 24 January 2018. Ann Arbor, MI.
- [20] “Proper orthogonal decomposition and resolvent analysis”. *47th AIAA Fluid Dynamics Conference*. 5-9 June 2017. Denver, CO.
- [21] “Model reduction in fluid mechanics: a short tutorial”. *Center for Turbulence Research Seminar*, Stanford University. 13 January 2017. Stanford, CA.
- [22] “Forced wavepacket models of turbulent jet noise”. *Center for Turbulence Research Seminar*, Stanford University. 1 April 2016. Stanford, CA.

- [23] “A convergent alternative to the parabolized stability equations”. *6th Symposium on Global Flow Instability and Control*. 28 September - 2 October 2015. Hersonissos, Crete, Greece.

Contributed

- [24] “Scalable resolvent and harmonic resolvent analysis with applications to complex jets”. *ERCOFTAC SIG 39 Symposium: Coherent Structures in Aeroacoustics*. 10-12 June 2024. Rome, Italy.
- [25] “Resolvent-based estimation of wavepackets in turbulent jets”. *AIAA/CEAS Aeroacoustics Conference*. 4-7 June 2024. Rome, Italy.
- [26] “Overview of a database for reduced-complexity modeling of fluid flows”. *76th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 19-21 November 2021. Washington, D.C.
- [27] “Space-time POD as a unifying framework for modal decomposition”. *75th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 20-22 November 2022. Indianapolis, IN.
- [28] “Resolvent-Based Estimation and Control of Aerodynamic Flows”. *Flow Control Open Forum / AIAA Aviation Forum*. 27 June – 1 July 2022. Chicago, IL.
- [29] “Recursive one-way Navier-Stokes equations: accurate, low-cost spatial marching.” *74th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 21-23 November 2021. Phoenix, AZ.
- [30] “An efficient algorithm for computing resolvent modes for three-dimensional jets.” *Euromech Colloquium 611: Jet Noise Modelling and Control*. 29 August – 1 September 2021. Poitiers, France.
- [31] “A spectral POD–Galerkin reduced–order model for turbulent shear flows”. *25th International Congress of Theoretical and Applied Mechanics (ICTAM 2020+1)*. 22 – 27 August 2021. Virtual.
- [32] “Galerkin projection via spectral proper orthogonal decomposition and resolvent modes.” *AIAA SciTech 2021 Forum*. 11-21 January 2021. Virtual.
- [33] “Time-frequency analysis of intermittent coherent structures in turbulent flows”. *72nd Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 23-26 November 2019. Seattle, WA.
- [34] “An investigation of the Mach number dependence of trapped acoustic waves in turbulent jets”. *25th AIAA/CEAS Aeroacoustics Conference*. 20-23 May 2019. Delft, Netherlands.
- [35] “Approximating space-time flow statistics from a limited set of known correlations”. *48th AIAA Fluid Dynamics Conference*. 25-29 June 2018. Atlanta, GA.
- [36] “Toward models for fluctuating wall quantities in incompressible turbulent flows”. *70th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 19-21 November 2017. Denver, CO.
- [37] “Spectral proper orthogonal decomposition and its connection with dynamic mode decomposition and resolvent analysis”. *Euromech Colloquium 591*. 18-20 September 2017. Bari, Italy.
- [38] “A statistical jet-noise model based on the resolvent framework.” *23rd AIAA/CEAS Aeroacoustics Conference*. 5-9 June 2017. Denver, CO.
- [39] “Incorporating correlated nonlinear forcing in resolvent-mode-based jet-noise models”. *Jet Noise Modelling and Control, Euromech Colloquium 571 / IUTAM Symposium*. 28-30 September 2016. Palaiseau, France.

- [40] “Trapped acoustic waves in the potential core of subsonic jets”. *22nd AIAA/CEAS Aeroacoustics Conference*. 30 May – 1 June 2016. Lyon, France.
- [41] “Empirical resolvent-mode decomposition”. *68th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 22-24 November 2015. Boston, MA.
- [42] “Stochastic and nonlinear forcing of wavepackets in a Mach 0.9 jet”. *21st AIAA/CEAS Aeroacoustics Conference*. 22-26 June 2015. Dallas, TX.
- [43] “Jet noise models using one-way Euler equations”. *67th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 23-25 November 2014. San Francisco, CA.
- [44] “Efficient jet noise models using the one-way Euler equations”. *168th Meeting of the Acoustical Society of America*. 27-31 October 2014. Indianapolis, IN.
- [45] “Continued development of the one-way Euler equations: application to jets”. *20th AIAA/CEAS Aeroacoustics Conference*. 16-20 June 2014. Atlanta, GA.
- [46] “One-way Euler equations: a novel spatial marching technique for convective instabilities”. *66th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 24-26 November 2013. Pittsburg, PA.
- [47] “Improved parabolization of the Euler equations”. *19th AIAA/CEAS Aeroacoustics Conference*. 27-29 May 2013. Berlin, Germany.
- [48] “One-way Euler equations”. *7th Southern California Symposium on Flow Physics*. 13 April 2013. Pasadena, CA.
- [49] “Improved parabolization of the compressible Euler equations”. *65th Annual Meeting of the American Physical Society Department of Fluid Dynamics*. 18-20 November 2012. San Diego, CA.
- [50] “Parabolized stability equations for jet noise prediction and control”. *6th Southern California Symposium on Flow Physics*. 14 April 2012. Santa Barbara, CA.

Updated: 06/06/2024