Tim Colonius

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Education

Stanford University
PhD, Mechanical Engineering, June 1994.
Thesis: Direct Computation of Aerodynamic Sound

Stanford University
MS, Mechanical Engineering, June 1988.

The University of Michigan
BSE(ME), Mechanical Engineering, *Summa Cum Laude* May 1987.

Principal Employment

California Institute of Technology

2022-now	Cecil and Sally Drinkward Leadership Chair; Executive Officer for Mechanical and Civil Engineering
2017-now	Frank and Ora Lee Marble Professor of Mechanical Engineering and Medical Engineering
2005-2017	Professor of Mechanical Engineering.
2000-2005	Associate Professor of Mechanical Engineering.
1994-2000	Assistant Professor of Mechanical Engineering.

Previous Appointments

Option Representative, Medical Engineering, Caltech (2017-2018)
Editor-in-chief, *Theoretical and Computational Fluid Dynamics* (2014-2021)
Visiting Professor, University of Melbourne, Australia (2016)
Undergraduate Option Representative, Mechanical Engineering, Caltech (2010-2015)
Visiting Professor, University of Poitiers, France (2010)
Handling Editor, *Theoretical and Computational Fluid Dynamics* (2003-2013)
Option Representative, Mechanical Engineering, Caltech (2001-2003, 2008)
Visiting Fellow, University of Cambridge, UK (2003)
Member of Technical Staff, FMC Corporate Technology Center, Santa Clara, CA (1994)
Graduate Research Assistant, Stanford University (1988-1994)

Research Interests

Understanding the fundamental mechanisms underlying complex unsteady flows and developing predictive theoretical, computational, and reduced-order models. Current interests include turbulence and coherent structures, aeroacoustics, instability and transition, unsteady aerodynamics and flow–structure interaction, cavitation and multiphase flows, numerical methods, and data-driven approaches motivated by challenges in aerospace and biomedicine.

Awards

University of Michigan Mechanical Engineering Department Merit Award (2025)
Ludwig Prandtl Memorial Lecture, International Association of Applied Mathematics and Mechanics (2022)
Freeman Scholar Award, The American Society of Mechanical Engineers (2022)
Stanley Corrsin Award, American Physical Society (2021)
Aeroacoustics Award, American Institute of Aeronautics and Astronautics (2018)
Fellow, Acoustical Society of America (2016).
Midwest Mechanics Invited Speaker (2012-2013)
Fellow, American Physical Society (2010).
Associate Fellow, American Institute of Aeronautics and Astronautics (2009)
AIAA Best Paper Award, 32nd AIAA Fluid Dynamics Conference (2003)
IUTAM Bureau Prize (2000)
NSF Career Award (1994-1999)
Powell Foundation Award (1997)

Teaching - Caltech

Thinking LIke an Engineer (ME 10; designed course)
Dimensional and Data Analysis in Engineering (ME40; undergraduate, designed course)
Mechanics (ME12a; undergraduate, designed course)
Thermal Science (ME11c; undergraduate, designed course)
Fluid Mechanics (ME19; undergraduate)
Fluid Mechanics (Ae/ME 101abc; graduate)
Computational Fluid Mechanics (Ae/ME 232ab; graduate)
Flow Control (Ae/ME 240; graduate, designed course)
Acoustic Waves in Fluids (ME201; graduate, designed course)
Signal Processing, Coherent Structures, and Reduced-Order Modeling in Turbulence (ME 201; graduate, designed course)
Heat Transfer (ME20; undergraduate)
Heat Transfer (ME119ab; graduate)
Design and analysis of control systems (CDS110; undergraduate, co-instructor)

Teaching - Short Courses

"Computational Aeroacoustics," von Karman Institute for Fluid Dynamics Lecture Series 1997-07: Aeroacoustics and active noise control, Sint-Genesius-Rode, Belgium, 1997.
"Computational Aeroacoustics," Cargese Summer School in Physics–Sound-Flow Interaction, Cargese, Corsica, France, 2000.
"Fundamentals of Aeroacoustics," von Karman Institute for Fluid Dynamics Lecture Series 2001-02: Advances in aeroacoustic, Sint-Genesius-Rode, Belgium, 2001.
"Computational aeroacoustics: overview and numerical methods," von Karman Institute for Fluid Dynamics Lecture Series 2006-05: Computational aeroacoustics, Sint-Genesius-Rode, Belgium, 2006.
"Noise Sources in Turbulent Shear Flows" CISM International Centre for Mechanical Sciences, Udine, Italy, 2011.

"Flow Control in aeroacoustics," UTIAS Summer School on Sustainable Aviation:Active Noise Control for Drag Reduction and Aviation, Toronto, CA, 2016.

"Immersed boundary and inteface methods," University of Sao Paolo Advanced School of Fluid Mechanics, Sao Paolo, Brazil, 2017.

"Modal decompositions in fluid mechanics: An overview," EPSRC Summer School on Modal Decompositions in Fluid Mechanics, Cambridge, UK, 2019.

"Modeling Transitional and Turbulent Flows Using Input–Output and Resolvent Analyses," Young ERCOFTAC Montestigliano Spring School for Graduate Students, Montestigliano, IT, 2026.

Caltech Committees

Academic Policies Committee (2004-2009)
Conduct Review Committee (2005-2018)
(Chair) Patents & Relations with Industry (2008-2009)
Graduate Study Committee (2001-2003,2008,2017-2018)
(Chair) Mechanical and Civil Engineering Curricula Committee (2010-2012)
(Chair) Mechanical and Civil Engineering 2025 Committee (2016)
Institute Computing Advisory Committee (2017-now)
(Chair) Mechanical and Civil Engineering Climate Committee (2019-2020)
(Chair) Institute Committee on Student Admissions and Recruiting (2020-2021)
High Performance Computing Advisory Group (2020-now)
Cyber Security Committee (2022-now)
Engineering and Applied Science Division Executive Committee (2023-now)
Committee on Undergraduate Education (2025-now)

Other Professional Activities

Principal/Co-Investigator: Airbus, Aeroacoustics Research Conssortium, AFOSR, Bosch Energy Research Network, Boeing, DARPA, JPL, Gordon and Betty Moore Foundation, NASA, NAVAIR, NIH, NSF, ONR.

International Conference on Multiphase Flow: Governing Board Member (2019-2025).

American Physical Society, Division of Fluid Dynamics: Chair-Elect (2025-2026); Vice Chair (2024-2025); Executive committee (2021-present, 2009-2012); Corrsin Award Committee (2022); Organizing committee, 63rd Annual DFD Meeting (2010); Acrivos Award Committee (2019-2021).

International Symposium on Cavitation: Member of scientific committee, (2006-now).

Institute of Cavitation Research (ICR) Advisory Committe: Member (2013-2014).

WIMRC Cavitation Forum: Member of scientific committee, (2011-now).

Consultant: United Technologies Research Center, Jet Propulsion Laboratory, AeroHydroPLUS, Applaud Medical, confidential clients.

American Institute of Aeronautics and Astronuatics: Aeroacoustics Award Committee (2019-2025); Discussion group on modal decompositions (2015-2016); Working gorup on flow control algorithms and architectures (2002-2004); Aeroacoustics Technical Committee (1996-2001); Technical co-chair, 4th AIAA / CEAS Aeroacoustics Conference (1998).

Symposium on Global Flow Instability and Control: Co chair, 1st-6th symposia (2001-2015).

Paper reviewer: J. Fluid Mech, Phys. Fluids, Phys. Rev. Fluids, J. Comput. Phys.,AIAA J., J. Sound Vibration, JASA, Int. J. Aeroacoustics., Theoret. Comput. Fluid Dyn., Europ. J. Mechanics B - fluids, SIAM J. Appl. Math., SIAM J. Sci. Comput., Exp. Fluids, J. Fluids Engrg., Fluid Dyn. Resrch., Int. J. Multiphase Flow, Comput. Meth. Appl. Mech. Engrg., Biomech. Model. Mechanobiology., Comput. Fluids, Turbo Expo, Ultrasound Medicine Bio., Int. J. Comput. Fluid Dyn., Int. J. Numeric. Meth. Fluids., Aerosp. Sci. Tech., Appl. Math. Model., Appl. Num. Math., Int. J. Heat Fluid Flow, J. Fluids Struct., Proc. Roy Soc. A.

Patents

[P1] Stewart Sherrit et al. Flow energy piezoelectric bimorph nozzle harvester. US Patent 9,531,303 B2, issued Dec 27, 2016.

[P2] Stewart Sherrit et al. Flow energy harvesting devices and systems. Patent pending. WO2017196454A2.

[P3] Byron Wilson et al. Tracheotomy device. Patent pending. WO20200222649.

Invited Lectures

[L1] University of California, AMES, San Diego, CA, 1996.

[L2] University of Tokyo, Mech. Engrg., Tokyo, Japan, 1996.

[L3] Caltech, Mech. Engrg., 1996.

[L4] Northrop Grumman Corp. Pico Rivera, CA, 1996.

[L5] Caltech, GALCIT Fluid Mechanics Sem., Pasadena, CA, 1998.

[L6] University of Arizona, Mech. and Aerosp. Engrg., Tuscon, AZ, 1999.

[L7] University of California, Los Angeles, Los Angeles, CA, 1999.

[L8] BERLIN99 Meeting of the Acoustical Society of America, Berlin, 1999.

[L9] University of California, AMES. San Diego, CA, 1999.

[L10] 3rd ASME/JSME Joint Fluids Engineering Conference, San Francisco, CA, 1999.

[L11] ICTAM 2000. Chicago, IL, 2000.

[L12] United Technologies Research Center, East Hartford, CT, 2000.

[L13] Stanford University, Fluid Mechanics, Stanford, CA, 2000.

[L14] Caltech, GALCIT Fluid Mechanics Sem., Pasadena, CA, 2000.

[L15] 39th AIAA Aerospace Sciences Meeting, Reno NV, 2001.

[L16] RWTH Aachen. Achen, Aerodynamisches Institute, Aachen, Germany, 2001.

[L17] Aerospace Corporation, El Segundo, CA, 2001.

[L18] Conference on Decision and Control, Las Vegas, NV, 2002.

[L19] Harvey Mudd College, Engrg. & Applied Sci. Pomona, CA, 2002.

[L20] University of Minnesota, Aerosp. Engrg., Minneapolis, MN, 2002.

[L21] 141st Meeting of Acoustical Society of America, Chicago, IL. 2003.

[L22] 146th Meeting of the Acoustical Society of America, Austin, TX, 2003.

[L23] University of Cambridge, DAMPT, Cambridge, UK, 2003.

[L24] University of Cambridge, Engineering., Cambridge, UK, 2003.

[L25] Florida State University, Dept. of Math., Tallahassee, Fl, 2003.

[L26] University of Twente, Enschede, The Netherlands, 2003.

[L27] Rolls Royce, Derby, UK, 2003.

[L28] United Technologies Research Center, East Hartford, CT, 2003.
[L29] 34th AIAA Fluid Dynamics Conference, Portland, OR, 2004.
[L30] Boeing Commercial Aircraft, Renton, WA, 2004.
[L31] NASA Langley Research Center, Hampton, VA, 2004.
[L32] University of Illinois at Urbana-Champaign, TAM, 2004.
[L33] KTH (Royal Institute of Techonlogy), Stockholm, Sweden, 2005.
[L34] (Keynote) 9th CEAS-ASC Workshop, Stockholm, Sweden, 2005.
[L35] Massachusettes Institute of Technology, Mechanical Engrg., Cambridge, MA, 2005.
[L36] Florida State University, Applied Mathematics, Tallahassee, Fl, 2006.
[L37] AIAA 3rd Flow Control Conference, San Francisco, CA, 2006.
[L38] University of California, Santa Barbara, Mech. Engrg. Santa Barbara, CA, 2006.
[L39] von Karman Institute for Fluid Dynamics, Lecture Series 2006-05, Sint-Genesius-Rode, Belgium, 2005.
[L40] World Congress on Computational Mechanics, Los Angeles, CA, 2006.
[L41] Princeton University MAE Dept., Princeton, NJ, 2007.
[L42] University of Rome 'La Sapienza', , Rome, Italy, 2007.
[L43] Universidad Politecnia de Madrid, Madrid, Spain, 2007.
[L44] SAIC Corporation, San Diego, CA, 2007.
[L45] University of Southern California, Aerospace and Mechanical Engineering, Los Angeles, CA, 2007.
[L46] AIAA 38th Fluid Dynamics Conference, Seattle WA, 2008.
[L47] AIAA 39th Fluid Dynamics Conference, Orlando, FL, 2009.
[L48] Florida State University, Mechanical Engineering, Tallahassee, FL, 2009.
[L49] Stanford University, Fluid Mechanics Seminar, Stanford, CA, 2009.
[L50] University of Illinois, Urbana-Champaign, Fluid Mechanics Seminar, Urbana, IL, 2009.
[L51] Universite Pierre et Marie Curie (Paris 6). Institut d'Alembert Seminar, Paris, France, 2010.
[L52] (Keynote) National Workshop on Aeroacoustics, Sponsored by Alenia Aeronautica and Centro Italiano Ricerche Aerospaziali, Capua, Italy, 2010.
[L53] Ecole Polytechnique, LadHyX seminar, Palaiseau, France, 2010.
[L54] Technical University of Eindhoven, Dept. of Applied Physics Seminar, Eindhoven, The Netherlands, 2010.
[L55] University of Poitiers, C.E.A.T. seminar. Poitiers, France, 2010. (3 seminars)
[L56] (Keynote) CFD 2010: 5th European Conf. on Comp. Fluid Dynamics. Lisbon, Portugal, 2010.
[L57] University of Melbourne, Australia, Fluid Mechanics Seminar, Melbourne, Australia, 2011.
[L58] University of California, San Diego, MAME seminar, San Diego, CA, 2011.
[L59] University of California, Santa Barbara, Mechanical Engineering, Santa Barbara, CA, 2012.
[L60] 100th Anniversary of the Aerodynamics Institute, RWTH Aachen, Germany, 2012.
[L61] Midwest Mechanics Invited Speaker. Seminars at Illinois Institute of Technology, Iowa State University, Michigan State University, Notre Dame University, Purdue University, Northwestern University, University of Illinois, University of Michigan, University of Minnesota, University of Wisconsin, 2012-2013.
[L62] (Keynote) ERCOFTAC Workshop, Direct and Large Eddy Simulation 9, Dresden, Germany, 2013.
[L63] EUROMECH 547, Trends in Open Shear Flow Instability, Paris, France, 2013.
[L64] AIAA Fluid Dynamics Conference, Future of Fluids Session, 2013.
[L65] University of California, Santa Barbara, Mechanical Engrg., Santa Barbara, CA, 2013.
[L66] University of California, Irvine, Mechanical and Aerosp. Engrg., Irvine, CA, 2014.

[L67] University of Maryland, Aerosp. Engrg., College Park, MD, 2014.
[L68] (Keynote) 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA, 2014.
[L69] AIAA SciTech 2015, Kissimmee, FL, 2015.
[L70] Boeing Research & Technology, Huntington Beach, CA, 2015.
[L71] University of Twente, Mechanical Engineering, Enschede, The Netherlands, 2015.
[L72] University of Melbourne, Mech. Engrg., Melbourne, Australia, 2016.
[L73] ONR Workshop on Active Flow Control, Pax River, MD, 2016.
[L74] University of Washington, Mech. Engrg., Seattle, WA, 2016.
[L75] AIAA Aviation 2017, Washington, DC, 2016.
[L76] (Keynote) 24th Intl. Congress of Theoretical and Applied Mechanics, Montréal, Canada, 2016.
[L77] (Keynote) 10th ABCM Spring School on Transition and Turbulence, San Jose Dos Campos, Brazil, 2016.
[L78] University of California, Santa Barbara, Fluid Mechanics, Santa Barbara, CA, 2016.
[L79] Workshop on the status and future directions of Wall-Modeled Large Eddy Simulation (WM-LES) for aeronautical applications, University of Maryland, 2016.
[L80] (Keynote) 3rd International Conference on Numerical Methods in Multiphase Flows, Tokyo, Japan, 2017.
[L81] 47th AIAA Fluid Dynamics Conference, Denver, CO, 2017.
[L82] Massachusetts Institute of Technology, Mechanical Engineering, 2017.
[L83] US-Japan workshop on Bridging Fluid Mechanics and Data Science,Tokyo, Japan, 2018.
[L84] (Keynote) 10th International Cavitation Symposium, Baltimore, MD 2018.
[L85] (Keynote) AIAA Aeroacoustics Award Lecture, AIAA Aviation 2018, Atlanta, GA, 2018.
[L86] University of Illinois at Urbana Champaign, Mechanical Engineering Seminar, 2018.
[L87] University of Michigan, Mechanical Engineering Seminar (2018).
[L88] Massachusetts Institute of Technology, Computational Engineering Seminar, 2018.
[L89] 176th Meeting of the Acoustical Society of America, Vancouver, BC Canada, 2018.
[L90] Uncertainty Quantification and Data Assimilation Minisymposium, SIAM Conference on Computational Science & Engineering, Spokane, WA, 2019.
[L91] (Keynote) 10th International Conference on Multiphase Flow. Rio de Janeiro, Brazil, 2019.
[L92] Caltech, Mechanical and Civil Engineering Seminar, Pasadena, CA, 2019.
[L93] University of Minnesota, Aerosp. Engrg., Minneapolis, MN, 2020.
[L94] Iowa State University, CoMFRE Seminar, Ames, IA, 2020.
[L95] University of British Columbia, Fluids Seminar Series, Vancouver, BC, 2020.
[L96] Stanford University, Fluids Mechanics Seminar, Palo Alto, CA, 2020.
[L97] Viginia Tech, Inaugural CREATe Seminar, Online, 2020.
[L98] Australasian Fluid Mechanics Seminar Series, Online, 2020.
[L99] Johns Hopkins University, CEAFM Seminar, Online, 2021.
[L100] Harbin Institute of Technology. Fluid Mechanics Webinar, Online, 2021.
[L101] University of Southern California, Aerospace & Mechanical Engineering Seminar, Los Angeles, CA, 2021.
[L102] (Keynote) Stanley Corrsin Award Lecture, 74th Annual Meeting of the APS DFD, Phoenix, AZ, 2021.
[L103] Peking University, Engineering Science Seminar, Online, 2021.
[L104] National University of Singapore, Department of Mechanical Engineering Distinguished Seminar Series, Online, 2021.

[L105] Isaac Newton Institute: Wall-bounded turbulence: beyond current boundaries, Cambridge University, Cambridge UK, 2022.
[L106] University of California, Los Angeles, Mechanical and Aerospace Engineering Seminar, Los Angeles, CA 2022.
[L107] (Keynote) Ludwig Prandtl Memorial Lecture, 92nd Annual Meeting of the International Association of Applied Mathematics and Mechanics. Aachen, Germany, 2022
[L108] (Keynote) Freeman Scholar Award Lecture, ASME Fluids Engineering Division Summer Meeting, Toronto, Canada, 2022.
[L109] (Keynote) 38th Argentinian Congress on Computational Mechanics (MECOM 2022), Bahia Blanca, Argentina, 2022.
[L110] University of Waterloo, MME Department Seminar, Online, 2022.
[L111] University of Texas El Paso, Advanced Modeling & Simulations Seminar Series, Online, 2022.
[L112] University of Wisconsin, Mechanics Seminar Series, Madison, WI, 2022.
[L113] Washington University St. Louis, Department of Mechanical Engineering & Materials Science Seminar, St. Louis, MO, 2022.
[L114] European-American-Japanese Two-phase Flow Group Meeting, Chamonix, France, 2022.
[L115] (Keynote) Acoustofluidics 2023, St. Louis, MO, 2023.
[L116] International Journal of Multiphase Flow 50th Anniversary Workshop, Vienna, Austria, 2023.
[L117] University of Notre Dame, Aerospace and Mechanical Engineering Seminar, South Bend, IN, 2024.
[L118] Seoul National University, Department of Mechanical Engineering Seminar, Seoul, South Korea, 2024.
[L119] ICTAM 2024, Daegu, South Korea, 2024.
[L120] Workshop on coherent structures for turbulence modeling, Santa Fe, NM, 2024.
[L121] University of California Berkeley, Fluid Mechanics Seminar, 2025.
[L122] 3rd Workshop on Data-Driven Fluid Mechanics, Nagoya, Japan, 2025.
[L123] (Keynote) 17th ERCOFTAC SIG 33 (Turbulence transition) Workshop, Vigo, Spain, 2026.

Submitted Articles

[S1] L. Heidt and T. Colonius, *Optimal frequency resolution for spectral proper orthogonal decomposition*, arXiv, 2024.

[S2] A. Nekkanti, T. Colonius, and O. T. Schmidt, *Nonlinear dynamics of vortex pairing in transitional jets*, arXiv, 2024.

[S3] M. K. Sleeman and T. Colonius, *Greedy recursion parameter selection for the One-Way Navier-Stokes (OWNS) equations*, arXiv, 2025.

[S4] J. G. von Saldern, O. T. Schmidt, P. Godbersen, J. M. Reumschüssel, and T. Colonius, *Band-Ensemble Spectral Proper Orthogonal Decomposition with Frequency Attribution*, arXiv, 2026.

Journal Articles

[J1] T. Colonius, S. K. Lele, and P. Moin, "The free compressible viscous vortex," *Journal of Fluid Mechanics*, vol. 230, pp. 45–73, 1991. DOI: 10.1017/S0022112091000708

[J2] T. Colonius, S. K. Lele, and P. Moin, "Boundary Conditions for Direct Computation of Aerodynamic Sound Generation," *AIAA Journal*, vol. 31, no. 9, pp. 1574–1582, 1993. DOI: 10.2514/3.11817

[J3] T. Colonius, S. K. Lele, and P. Moin, "The scattering of sound waves by a vortex: numerical simulations and analytical solutions," *Journal of Fluid Mechanics*, vol. 260, pp. 271–298, 1994. DOI: 10.1017/S0022112094003514

[J4] T. Colonius, "Aeroacoustics," *Aerospace America*, vol. 33, no. 12, p. 8, 1995.

[J5] T. Colonius, "Numerically Nonreflecting Boundary and Interface Conditions for Compressible Flow and Aeroacoustic Computations," *AIAA Journal*, vol. 35, no. 7, pp. 1126–1133, 1997. DOI: 10.2514/2.235

[J6] T. Colonius, S. K. Lele, and P. Moin, "Sound generation in a mixing layer," *Journal of Fluid Mechanics*, vol. 330, pp. 375–409, 1997.

[J7] R. Kedia, M. L. Hunt, and T. Colonius, "Numerical Simulations of Heat Transfer in Taylor-Couette Flow," *Journal of Heat Transfer*, vol. 120, no. 1, pp. 65–71, 1998. DOI: 10.1115/1.2830066

[J8] R. Kedia, M. L. Hunt, and T. Colonius, "Transition of Chaotic Flow in a Radially Heated Taylor-Couette System," *Journal of Heat Transfer*, vol. 121, no. 3, pp. 574–582, 1999. DOI: 10.1115/1.2826018

[J9] T. Colonius, F. d'Auria, and C. Brennen, "Acoustic Saturation in Bubbly Cavitating Flow Adjacent to an Oscillating Wall," *Physics of Fluids*, vol. 12, no. 11, pp. 2752–2761, 2000. DOI: 10.1063/1.1313561

[J10] T. Colonius and J. B. Freund, "Application of Lighthill's Equation to a Mach 1.92 Turbulent Jet," *AIAA Journal*, vol. 38, no. 2, pp. 368–370, 2000. DOI: 10.2514/2.966

[J11] K. Mohseni and T. Colonius, "Numerical Treatment of Polar Coordinate Singularities," *Journal of Computational Physics*, vol. 157, no. 2, pp. 787–795, 2000. DOI: 10.1006/jcph.1999.6382

[J12] C. W. Rowley and T. Colonius, "Discretely Nonreflecting Boundary Conditions for Linear Hyperbolic Systems," *Journal of Computational Physics*, vol. 157, no. 2, pp. 500–538, 2000. DOI: 10.1006/jcph.1999.6383

[J13] J. Zhou, F. Rusnak, T. Colonius, and G. M. Hathaway, "Quasi-linear gradients for capillary liquid chromatography with mass and tandem mass spectrometry," *Rapid Communications in Mass Spectrometry*, vol. 14, no. 6, pp. 432–438, 2000. DOI: 10.1002/(SICI)1097-0231(20000331)14:6\%3C432::AID-RCM886\%3E3.0.CO;2-T

[J14] K. Mohseni, H. Ran, and T. Colonius, "Numerical experiments on vortex ring formation," *Journal of Fluid Mechanics*, vol. 430, pp. 267–282, 2001. DOI: 10.1017/S0022112000003025

[J15] T. Colonius and H. Ran, "A Super-Grid-Scale Model for Simulating Compressible Flow on Unbounded Domains," *Journal of Computational Physics*, vol. 182, no. 1, pp. 191–212, 2002. DOI: 10.1006/jcph.2002.7161

[J16] J. D. Eldredge, T. Colonius, and A. Leonard, "A dilating vortex p@article method for compressible flow," *Journal of Turbulence*, vol. 2002, no. 3, Art. No. 036, 2002.

[J17] J. D. Eldredge, T. Colonius, and A. Leonard, "A Vortex Particle Method for Two-Dimensional Compressible Flow," *Journal of Computational Physics*, vol. 179, no. 2, pp. 371–399, 2002. DOI: 10.1006/jcph.2002.7060

[J18] J. D. Eldredge, A. Leonard, and T. Colonius, "A General Deterministic Treatment of Derivatives in P@article Methods," *Journal of Computational Physics*, vol. 180, no. 2, pp. 686–709, 2002. DOI: 10.1006/jcph.2002.7112

[J19] K. Mohseni, T. Colonius, and J. B. Freund, "An evaluation of linear instability waves as sources of sound in a supersonic turbulent jet," *Physics of Fluids*, vol. 14, no. 10, pp. 3593–3600, 2002. DOI: 10.1063/1.1501545

[J20] Y. A. Pishchalnikov et al., "Cavitation Damage to Kidney Stones in SWL Involves the Action of Bubble Clusters: New Observations Using Ultra-High Speed Imaging in Vitro," *Journal of Urology Supplement*, vol. 167, no. 4, S261–S262, 2002.

[J21] A. T. Preston, T. Colonius, and C. E. Brennen, "A Numerical Investigation of Unsteady Bubbly Cavitating Nozzle Flows," *Physics of Fluids*, vol. 14, no. 1, pp. 300–311, 2002. DOI: 10.1063/1.1416497

[J22] C. W. Rowley, T. Colonius, and A. J. Basu, "On self-sustained oscillations in two-dimensional compressible flow over rectangular cavities," *Journal of Fluid Mechanics*, vol. 455, pp. 315–346, 2002. DOI: 10.1017/S0022112001007534

[J23] Y. A. Pishchalnikov et al., "Cavitation Bubble Cluster Activity in the Breakage of Kidney Stones by Lithotripter Shock Waves," *Journal of Endourology*, vol. 17, no. 7, pp. 435–446, 2003. DOI: 10.1089/089277903769013568

[J24] T. Suzuki and T. Colonius, "Inverse-Imaging Method for Detection of a Vortex in a Channel," *AIAA Journal*, vol. 41, no. 9, pp. 1743–1751, 2003. DOI: 10.2514/2.7292

[J25] T. Colonius, "Modeling Artificial Boundary Conditions for Compressible Flow," *Annual Review of Fluid Mechanics*, vol. 36, pp. 315–345, 2004. DOI: 10.1146/annurev.fluid.36.050802.121930

[J26] T. Colonius and S. K. Lele, "Computational aeroacoustics: progress on nonlinear problems of sound generation," *Progress in Aerospace Sciences*, vol. 40, no. 6, pp. 345–416, 2004. DOI: 10.1016/j.paerosci.2004.09.001

[J27] C. W. Rowley, T. Colonius, and R. M. Murray, "Model reduction for compressible flows using POD and Galerkin projection," *Physica D*, vol. 189, pp. 115–129, 2004. DOI: 10.1016/j.physd.2003.03.001

[J28] T. Suzuki, T. Colonius, and S. Pirozzoli, "Vortex shedding in a two-dimensional diffuser: theory and simulation of separation control by periodic mass injection," *Journal of Fluid Mechanics*, vol. 520, pp. 187–213, 2004. DOI: 10.1017/S0022112004001405

[J29] K. Weinberg, T. Colonius, and M. Ortiz, "A Model for Kidney Tissue Damage under High Speed Loading," *Proceedings in Applied Mathematics and Mechanics*, vol. 4, no. 1, pp. 234–235, 2004. DOI: 10.1002/pamm.200410098

[J30] M. R. Bailey, J. A. McAteer, Y. A. Pishchalnikov, M. F. Hamilton, and T. Colonius, "Progress in Lithotripsy Research," *Acoustics Today*, vol. 2, no. 2, pp. 18–29, 2006.

[J31] E. Johnsen and T. Colonius, "Implementation of WENO Schemes in Compressible Multicomponent Flow Problems," *Journal of Computational Physics*, vol. 219, no. 2, pp. 715–732, 2006. DOI: 10.1016/j.jcp.2006.04.018

[J32] C. W. Rowley, D. R. Williams, T. Colonius, R. M. Murray, and D. G. MacMynowski, "Linear models for control of cavity flow oscillations," *Journal of Fluid Mechanics*, vol. 547, pp. 317–330, 2006. DOI: 10.1017/S0022112005007299

[J33] T. Suzuki and T. Colonius, "Instability waves in a subsonic round jet detected using a near-field phased microphone array," *Journal of Fluid Mechanics*, vol. 565, pp. 197–226, 2006. DOI: 10.1017/S0022112006001613

[J34] J. B. Freund, T. Colonius, and A. P. Evan, "A Cumulative Shear Mechanism for Tissue Damage Initiation in Shock-Wave Lithotripsy," *Ultrasound in Medicine and Biology*, vol. 33, no. 9, pp. 1495–1503, 2007. DOI: 10.1016/j.ultrasmedbio.2007.03.001

[J35] A. T. Preston, T. Colonius, and C. E. Brennen, "A reduced-order model of diffusive effects on the dynamics of bubbles," *Physics of Fluids*, vol. 19, no. 12, Art. No. 123302, 2007. DOI: 10.1063/1.2825018

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Doctoral students (as advisor)

[PhD1] K. Mohseni, "A: Universality in vortex formation; B: Evaluation of Mach wave radiation in a supersonic jet," Ph.D. dissertation, California Institute of Technology, 2000.

[PhD2] J. Eldredge, "A dilating vortex particle method for compressible flow with application to aeroacoustics," Ph.D. dissertation, California Institute of Technology, 2001.

[PhD3] C. Rowley, "Modeling, simulation, and control of cavity flow oscillations," Ph.D. dissertation, California Institute of Technology, 2001.

[PhD4] A. Preston, "Modeling heat and mass transfer in bubbly cavitating flows and shock waves in cavitating nozzles," Ph.D. dissertation, California Institute of Technology, 2004.

[PhD5] M. Tanguay, "Computation of bubbly cavitating flow in shock wave lithotripsy," Ph.D. dissertation, California Institute of Technology, 2004.

[PhD6] H. Ran, "Numerical Study of the Dynamics and Sound Generation of a Turbulent Vortex Ring," Ph.D. dissertation, California Institute of Technology, 2005.

[PhD7] G. Brés, "Numerical simulations of three-dimensional instabilities in cavity flows," Ph.D. dissertation, California Institute of Technology, 2007.

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[PhD10] J. Franck, "Large-eddy simulation of flow separation and control on a wall-mounted hump," Ph.D. dissertation, California Institute of Technology, 2009.

[PhD11] K. Ando, "Effects of polydispersity in bubbly flows," Ph.D. dissertation, California Institute of Technology, 2010.

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[PhD13] W. T. Joe, "Optimized feedback control of vortex shedding on an inclined flat plate," Ph.D. dissertation, California Institute of Technology, 2010.

[PhD14] J. Krimmel, "Numerical simulation of wave focusing and scattering in shock wave lithotripsy," Ph.D. dissertation, California Institute of Technology, 2010.

[PhD15] V. Coralic, "Simulation of shock-induced bubble collapse with application to vascular injury in shockwave lithotripsy," Ph.D. dissertation, California Institute of Technology, 2015.

[PhD16] J. Choi, "Unsteady aerodynamics and optimal control of an airfoil at low Reynolds number," Ph.D. dissertation, California Institute of Technology, 2016.

[PhD17] S. Liska, "Fast Lattice Green's Function Methods for Viscous Incompressible Flows on Unbounded Domains," Ph.D. dissertation, California Institute of Technology, 2016.

[PhD18] J. Meng, "Numerical Simulations of Droplet Aerobreakup," Ph.D. dissertation, California Institute of Technology, 2016.

[PhD19] A. Towne, "Advancements in jet turbulence and noise modeling: accurate one-way solutions and empirical evaluation of the nonlinear forcing of wavepackets," Ph.D. dissertation, California Institute of Technology, 2016.

[PhD20] H.-C. Tsai, "Numerical Investigation of Vertical-Axis Wind Turbines at Low Reynolds Number," Ph.D. dissertation, California Institute of Technology, 2016.

[PhD21] A. Goza, "Numerical Methods for Fluid-Structure Interaction, and their Application to Flag Flapping," Ph.D. dissertation, California Institute of Technology, 2018.

[PhD22] K. Maeda, "Simulation, Experiments, and Modeling of Cloud Cavitation with Application to Burst Wave Lithotripsy," Ph.D. dissertation, California Institute of Technology, 2018.

[PhD23] A. da Silva, "An EnKF-based Flow State Estimator for Aerodynamic Problems," Ph.D. dissertation, California Institute of Technology, 2019.

[PhD24] L. P. Tosi, "Fluid-Structure Instability in an Internal Flow Energy Harvester," Ph.D. dissertation, California Institute of Technology, 2019.

[PhD25] E. M. Pickering, "Resolvent Modeling of Turbulent Jets," Ph.D. dissertation, California Institute of Technology, 2021.

[PhD26] K. Yu, "Multi-resolution Lattice Green's Function Method for High Reynolds Number External Flows," Ph.D. dissertation, California Institute of Technology, 2021.

[PhD27] O. Kamal, "Optimal Receptivity and the Generalization of the One-Way Navier-Stokes (OWNS) Equations to Complex High-Speed Boundary Layers and Jets," Ph.D. dissertation, California Institute of Technology, 2022.

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[PhD29] B. Stevens, "Applications of Machine Learning to Finite Volume Methods," Ph.D. dissertation, California Institute of Technology, 2022.

[PhD30] L. Heidt, "Modal analysis of harmonically forced turbulent flows with application to jets," Ph.D. dissertation, California Institute of Technology, 2024.

[PhD31] J. S. Spratt, "Numerical Simulations of Cavitating Bubbles in Elastic and Viscoelastic Materials for Biomedical Applications," Ph.D. dissertation, California Institute of Technology, 2024.

[PhD32] R. Arun, "Beyond Symmetry: Normality-Based Analysis of Velocity Gradients in Turbulent Flows," Ph.D. dissertation, California Institute of Technology, 2025.

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