

ARNAB SAMANTA – CURRICULUM VITAE

Department of Aerospace Engineering
Indian Institute of Technology
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Date of Birth: 18th Dec, 1978

EDUCATION

Ph.D Theoretical & Applied Mech.		Univ. of Illinois at Urbana-Champaign	Feb 2009
M.E Aerospace Engineering	1st (Distn.)	Indian Inst. of Science, Bangalore	Jun 2004
B.E Mechanical Engineering	1st (Hons.)	Jadavpur University, Calcutta	May 2001

EMPLOYMENT

Associate professor	2020-now
Department of Aerospace Engineering, Indian Institute of Technology, Kanpur, India	
Assistant professor	2011-2020
Department of Aerospace Engineering, Indian Institute of Science, Bangalore, India	
Affiliate faculty	2013-2017
Interdisciplinary Centre for Energy Research, Indian Institute of Science, Bangalore, India	
Postdoctoral scholar	2009-2010
Department of Mechanical Engineering, California Institute of Technology, Pasadena, USA	

RESEARCH

Primary Interests

Fluid mechanics, theoretical and computational aeroacoustics, linear and non-linear stability theories, wave motion, reacting flows

Funding

Office of Naval Research USA (ONR-Global), Aeronautics Research & Development Board (AR&DB), UK-India Education & Research Initiative (UKIERI), ISRO-IISc Space Technology Cell (STC), Joint Advanced Technology Program (JATP), IISc seed grant

AWARDS

Thomas J. and Virginia Fisher Dolan Graduate Award, Department of Theoretical & Applied Mechanics, University of Illinois at Urbana-Champaign, 2005

Travel Fellowship, Department of Theoretical & Applied Mechanics, University of Illinois at Urbana-Champaign, 2004

TEACHING

Aeroacoustics (advance graduate level), Indian Institute of Science, Fall 2016 (*new course introduced*)

Hydrodynamic Stability (advance graduate level), Indian Institute of Science, Spring 2012, 2013, 2014, 2015, 2018 (*new course introduced*) [Average student rating: 4.5/5.0]

Updated: Sep 29th, 2020

Engineering Mathematics (graduate level), Indian Institute of Science, Spring 2019 (*new lectures developed*)

Fluid Dynamics (graduate level), Indian Institute of Science, Fall 2011, 2014 (*new lectures developed*)
[Average student rating: 4.0/5.0]

Introductory Fluid Mechanics (undergraduate level), University of Illinois at Urbana-Champaign, Summer 2008

PROFESSIONAL ACTIVITIES

Journal Paper Referee

J. Fluid Mech., *Phys. Rev. Fluids*, *Phys. Rev. Lett.*, *Phys. Rev. Appl.*, *J. Sound Vib.*, *Comput. Fluids*, *J. Acoust. Soc. Am.*, *Appl. Acoust.*, *J. Eng. Math.*, *Int. J. Heat Fluid Flow*, *Fluid Dyn. Res.*, *Sadhana*

Book Proposal Reviewer

Wiley-Blackwell publishers

Conference Paper Referee

ASME Turbo Expo

Session Chair

AIAA/CEAS Aeroacoustics Delft 2019, *APS-DFD* Atlanta 2018, *APS-DFD* Denver 2017, *APS-DFD* Boston 2015, '*Combustion Instability in Swirl Stabilized Combustors*' Bangalore 2014

Paper Setter

AE paper *GATE* 2012–14

Technical Reviewer

DST-SERB, *MHRD-SPARC* proposals

Memberships

American Institute of Aeronautics & Astronautics (AIAA), Indian Physics Association (IPA)

SERVICE AT INDIAN INSTITUTE OF SCIENCE

Examiner

Comprehensive exam committee: as Senate nominee in *Mechanical Engineering*, *IISc Mathematics Initiative (IMI)* and as department expert; common examiner M.Tech dissertations 2011

Interviewer

Department research interview committees 2011-17; IMI interviews 2013-14

Convener

Department seminar committee 2012–14; department website committee 2013

Member

Department M.Tech curriculum review committee 2017; department medals committee 2012, 2015–16; department court report committee 2011, 2014–15; '*Advances in Aerospace Sciences*' organizing committee 2014; department open day committee 2013–14

INVITED TALKS

- [T1] Samanta, A. 2017 Transient growth in swirling jets with vortex breakdown. *Journal of Fluid Mechanics Symposia: From Fundamentals to Applied Fluid Mechanics*, Bangalore, India, Dec 2017.
- [T2] Samanta, A. 2013 Development of lower-order models to compute jet noise. *TIFR-CAM Weekly Colloquium*, TIFR-Centre for Applicable Mathematics (CAM), Bangalore, Mar 2013.
- [T3] Samanta, A. 2011 Subsonic scattering of instability and acoustic waves at a shrouded-jet exit. *Research Seminar*, Vikram Sarabhai Space Centre (VSSC), Indian Space Research Organization (ISRO), Thiruvananthapuram, Aug 2011.
- [T4] Samanta, A. 2011 Using reduced-order models for predicting turbulent jet noise and other aeroacoustic phenomena. *Research Seminar*, National Aerospace Laboratories (NAL), CTFD Division, Bangalore, Apr 2011.
- [T5] Samanta, A. 2011 Large-scale models for predicting mixing noise of turbulent round jets. *Research Seminar Series*, ISRO-IISc Space Technology Cell, Bangalore, Apr 2011.
- [T6] Samanta, A. 2010 Far-field radiation of large-scale turbulent structures using wave-packet models. *Fluid Mechanics Research Seminar*, GALCIT, California Institute of Technology, Pasadena, USA, Apr 2010.
- [T7] Samanta, A. 2009 Finite-wavelength scattering of incident vorticity and acoustic waves at a shrouded jet exit. *Mechanical Engineering Seminar*, California Institute of Technology, Pasadena, USA, Apr 2009.
- [T8] Samanta, A. 2009 Finite-wavelength scattering of incident vorticity and acoustic waves at a shrouded jet exit. *Fluid Mechanics Seminar*, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, USA, Feb 2009.
- [T9] Samanta, A. 2009 Finite-wavelength scattering of incident vorticity and acoustic waves at a shrouded jet exit. *Department of Aerospace Engineering Seminar*, Indian Institute of Science, Bangalore, India, Jan 2009.
- [T10] Samanta, A. 2008 Acoustic reflection of vorticity waves at a shrouded-jet exit in “howling” resonances. *AFM Seminar Program*, University of Southampton, UK, Sep 2008.
- [T11] Samanta, A. 2008 Super-resonances in AEDC altitude test cells. *2008 AFOSR Test and Evaluation Portfolio Review*, Reston, Virginia, USA, Aug 2008.
- [T12] Samanta, A. 2006 Robustness of acoustic analogies for predicting mixing-layer noise. *TAM Seminars*, University of Illinois at Urbana-Champaign, Urbana, USA, Fall 2006.

JOURNAL ARTICLES (REFEREED)

- [J1] Balakrishna, N., Mathew, J. & Samanta, A. 2020 Inviscid and viscous global stability of vortex rings. *J. Fluid Mech.*, **902**, A9.
- [J2] Kumar, S. & Samanta, A. 2019 Global thermoacoustic oscillations in a thermally driven pulse tube. *Theor. Comput. Fluid Dyn.*, **33** (5), 433–461.
- [J3] Muthiah, G. & Samanta, A. 2018 Transient energy growth of a swirling jet with vortex breakdown. *J. Fluid Mech.*, **856**, 288–322.
- [J4] Yadav, N. K. & Samanta, A. 2017 The stability of compressible swirling pipe flows with density stratification. *J. Fluid Mech.*, **823**, 689–715.
- [J5] Chary, P. S. & Samanta, A. 2016 Linear models for sound from supersonic reacting mixing layers. *Phys. Rev. Fluids*, **1**, 083801 (27 pages).
- [J6] Samanta, A. 2016 On the axisymmetric stability of heated supersonic round jets. *Proc. R. Soc. A*, **472** (2188), 20150817 (19 pages).
- [J7] Samanta, A. & Freund, J. B. 2015 A model supersonic buried-nozzle jet: instability and acoustic wave scattering and the far-field sound. *J. Fluid Mech.*, **778**, 189–215.
- [J8] Samanta, A., Appelö, D., Colonius, T., Nott, J. & Hall, J. 2011 Reply by the authors to G. E. Dorrington. *AIAA J.*, **49** (4), 877–878.
- [J9] Colonius, T., Samanta, A. & Gudmundsson K. 2010 Parabolized stability equation models of large-scale jet mixing noise. *Procedia Engineer.*, **6**, 64–73.
- [J10] Samanta, A., Appelö, D., Colonius, T., Nott, J. & Hall, J. 2010 Computational modeling and experiments of natural convection for a Titan Montgolfiere. *AIAA J.*, **48** (5), 1007–1016.
- [J11] Samanta, A. & Freund, J. B. 2008 Finite-wavelength scattering of incident vorticity and acoustic waves at a shrouded jet exit. *J. Fluid Mech.*, **612**, 407–438.
- [J12] Samanta, A., Freund, J. B., Wei, M. & Lele, S. K. 2006 Robustness of acoustic analogies for predicting mixing-layer noise. *AIAA J.*, **44** (11), 2780–2786,

CONFERENCE PAPERS (REFEREED)

- [C1] Muthichur, N., Hemchandra, S., Tummalapalli, H. & Samanta, A. 2020 Sources of sound and its radiation from twin turbulent jets. *AIAA Scitech 2020 Forum*, Orlando, Florida, USA, Jan 2020. *AIAA paper no. 2020-1245*.
- [C2] Kumar, S. & Samanta, A. 2019 The role of global thermoacoustic modes in energy exchange of a finite-length thermally-driven duct. *25th AIAA/CEAS Aeroacoustics Conference*, Delft, The Netherlands, May 2019. *AIAA paper no. 2019-2593*.
- [C3] Samanta, A. 2016 Effect of heating and compressibility on the instability of supersonic jets. *22nd AIAA/CEAS Aeroacoustics Conference*, Lyon, France, May–June 2016. *AIAA paper no. 2016-3054*.

- [C4] Samanta, A. & Freund, J. B. 2015 Upstream radiation from supersonic buried-nozzle jets via scattering at the shroud edge. *22nd AIAA/CEAS Aeroacoustics Conference*, Dallas, Texas, USA, Jun 2015. *AIAA paper no. 2015-2523*.
- [C5] Raghavan, S., Mahapatra, D. R. & Samanta, A. 2013 Modeling and simulation of hydrodynamic interaction of DNA in a micro-fluidic channel. *2nd Global Congress on Nano Engineering for Medicine and Biology*, Boston, Massachusetts, USA, Feb 2013. *Paper no. NEMB2013-93217*.
- [C6] Rodriguez, D., Samanta, A., Cavalieri, A. V., Colonius, T. & Jordan, P. 2011 Parabolized stability equation models for predicting large-scale mixing noise of turbulent round jets, *32nd AIAA Aeroacoustics Conference*, Portland, Oregon, USA, Jun 2011. *AIAA paper no. 2011-2838*.
- [C7] Samanta, A. & Freund, J. B. 2008 Acoustic reflection of vorticity waves at a shrouded-jet exit in “howling” resonances. *29th AIAA Aeroacoustics Conference*, Vancouver, British Columbia, Canada, May 2008. *AIAA paper no. 2008-3051*.
- [C8] Freund, J. B., Topalian, V., Samanta, A., Kim, J. & Hasselbacher, A. 2007 Superresonances in AEDC altitude test cells. *U.S. Air Force T&E Days*, Destin, Florida, USA, Feb 2007. *AIAA paper no. 2007-1619*.
- [C9] Freund, J. B., Samanta, A., Wei, M. & Lele, S. K. 2005 The robustness of acoustic analogies. *26th AIAA Aeroacoustics Conference*, Monterey, California, USA, May 2005. *AIAA paper no. 2005-2940*.

CONFERENCE PAPERS & PUBLISHED ABSTRACTS (NON-REFEREED)

- [A1] Samanta, A., Muthichur, N., Hemchandra, S., & Tummalapalli, H. 2019 Sound sources in subsonic twin turbulent jets. *72nd Annual Meeting of the APS Division of Fluid Dynamics*, Seattle, Washington, USA, Nov 2019.
- [A2] Samanta, A. 2018 Transient growth mechanisms in a high-speed rapidly-swirling jet with vortex breakdown. *71st Annual Meeting of the APS Division of Fluid Dynamics*, Atlanta, Georgia, USA, Nov 2018.
- [A3] Kumar, S. R. & Samanta, A. 2017 Global thermoacoustic oscillations in a thermally driven pulse tube. *Fluids Day: Presentations and Discussions on Fluid Mechanics*, Bangalore, India, Dec 2017.
- [A4] Muthichur, N., Hemchandra, S. & Samanta, A. 2017 Noise radiation characteristics of interacting subsonic twin turbulent jets. *Fluids Day: Presentations and Discussions on Fluid Mechanics*, Bangalore, India, Dec 2017.
- [A5] Balakrishna, N., Mathew, J. & Samanta, A. 2017 Biglobal stability of vortex rings. *Fluids Day: Presentations and Discussions on Fluid Mechanics*, Bangalore, India, Dec 2017.
- [A6] Samanta, A. & Muthiah, G. 2017 Transient growth from the continuous spectrum of a high-speed rapidly-swirling jet. *70th Annual Meeting of the APS Division of Fluid Dynamics*, Denver, Colorado, USA, Nov 2017.

- [A7] Balakrishna, N., Mathew, J. & Samanta, A. 2017 Biglobal stability of vortex rings. *70th Annual Meeting of the APS Division of Fluid Dynamics*, Denver, Colorado, USA, Nov 2017.
- [A8] Chary, P. S. & Samanta, A. 2016 Spatial stability of compressible reacting mixing layers. *6th International Congress on Computational Mechanics & Simulation (ICCMS)*, IIT Bombay, India, Jun–Jul 2016.
- [A9] Samanta, A. 2013 Acoustic far-field of shroud-lip-scattered instability modes of supersonic coflowing jets. *66th Annual Meeting of the APS Division of Fluid Dynamics*, Pittsburgh, Pennsylvania, USA, Nov 2013.
- [A10] Chary, P. S. & Samanta, A. 2013 Spatial stability of compressible reacting mixing layers. *6th Symposium on Applied Aerodynamics & Design of Aerospace Vehicles (SAROD)*, Hyderabad, India, Nov 2013.
- [A11] Nagpal, A., Samanta, A. & Hemchandra, S. 2013 Computational study of interacting twin jets. *6th Symposium on Applied Aerodynamics & Design of Aerospace Vehicles (SAROD)*, Hyderabad, India, Nov 2013.
- [A12] Rodriguez, D., Colonius, T., Samanta, A. & Khalighi, Y. 2011 Parabolized stability equation (PSE) models for the prediction of mixing noise in turbulent jets: comparison with large eddy simulation. *64th Annual Meeting of the APS Division of Fluid Dynamics*, Baltimore, Maryland, USA, Nov 2011.
- [A13] Colonius, T., Rodriguez, D., Samanta, A., Cavalieri, A. V. & Jordan, P. 2011 Parabolized stability equation (PSE) models for the prediction of mixing noise in turbulent jets: nonlinearity and comparison with experiments. *64th Annual Meeting of the APS Division of Fluid Dynamics*, Baltimore, Maryland, USA, Nov 2011.
- [A14] Samanta, A., Gudmundsson, K. & Colonius, T. 2010 Non-linear parabolized stability equation (NPSE) models for predicting large-scale mixing noise of turbulent round jets. *63rd Annual Meeting of the APS Division of Fluid Dynamics*, Long Beach, California, USA, Nov 2010.
- [A15] Samanta, A., Gudmundsson, K., Reba, R. & Colonius, T. 2009 Far-field radiation of large-scale turbulent structures using wave-packet models. *62nd Annual Meeting of the APS Division of Fluid Dynamics*, Minneapolis, Minnesota, USA, Nov 2009.
- [A16] Samanta, A. 2009 Acoustic reflection of vorticity waves at a shrouded-jet exit in “howling” resonances. *3rd Southern California Symposium on Flow Physics*, University of California, San Diego, USA, Apr 2009.
- [A17] Samanta, A. & Freund, J. B. 2007 Finite-wavelength scattering of incident vorticity waves at a shrouded jet exit. *60th Annual Meeting of the APS Division of Fluid Dynamics*, Salt Lake City, Utah, USA, Nov 2007.
- [A18] Topalian, V., Samanta, A. & Freund, J. B. 2006 Acoustically coupled jet resonance in a finite-length duct. *59th Annual Meeting of the APS Division of Fluid Dynamics*, Tampa Bay, Florida, USA, Nov 2006.

THESES SUPERVISED AT INDIAN INSTITUTE OF SCIENCE

Ph.D.

1	Chandan Vempati	since 2019	<i>Aeroacoustics of supersonic jets</i>
2	Shashi Shekhar Roy	since 2017	<i>Global stability and control of merging jets</i>
3	Naveen Balakrishna <i>Co-supervisor: Prof. J. Mathew</i>	since 2016	<i>Structure of last stages of jet breakdown</i>
4	Nishanth Muthichur <i>Co-supervisor: Dr. S. Hemchandra</i>	since 2016	<i>Noise sources and sound from merging subsonic jets</i>

M.Tech.(Res.)

1	Aliasgar Rangwala	since 2018	<i>Adjoint based control of swirling flows</i>
2	Charulatha M.	2018	<i>Modal and non-modal stability of swirling jets</i>
3	P. Shivakanth Chary ¹	2017	<i>Linear stability models for reacting mixing layers</i>

M.Tech.

1	Aditya K.	2019	<i>Semi-analytical modeling of open rotor noise sources</i>
2	Gopalsamy Muthiah ²	2017	<i>Non-modal stability of swirling jets</i>
3	Nishanth Muthichur ³ <i>Co-supervisor: Dr. S. Hemchandra</i>	2016	<i>An LES study to compare the dynamics of a single and twin turbulent jet</i>
4	Gaurav ⁴	2014	<i>Biglobal stability of a rotating cylindrical tank</i>
5	Abhishek Mishra ⁵	2014	<i>Spatial stability of compressible swirling flows</i>
6	Ankur Nagpal ⁶	2013	<i>A two dimensional computational study of interacting twin jet noise</i>

¹currently, graduate student at Oklahoma State University, Stillwater, USA

²currently, scientist at ISRO

³currently, continuing as Ph.D. student

⁴currently, working at Flipkart

⁵winner of *D. Narayanmurti Medal* for best M.Tech. student 2014; currently, graduate student at Georgia Tech., USA

⁶winner of *Sabita Chaudhuri Medal* for best M.Tech. student 2013; currently, scientist at ISRO

Project Students

- 1 Chandan Vempati, M.S. Univ. of Illinois at Urbana–Champaign. *Aeroacoustics of supersonic merging jets*. 2018 – 2019. *Joined as* graduate student at the Indian Institute of Science, Bangalore, India.
- 2 Saravana Kumar, M.Tech. IIT Bombay. *Thermoacoustic oscillations in a thermally-driven pulse tube*. 2016–18. *Joined as* graduate student at University of Twente, Netherlands.

- 3 Navneet Yadav, B.Tech. IIT Jodhpur. *Stability of rotating pipe flows; aeroacoustics of supersonic merging jets*. 2015–18.
- 4 Sathyanarayan Chandramouli, M.S. KTH Sweden. *Aeroacoustics of supersonic merging jets*. 2016–17. *Joined as graduate student at Florida State University, Tallahassee, USA.*
- 5 Ansuman Pradhan, M.S. Chalmers University. *Biglobal stability of swirling jets*. 2015–17.
- 6 Kishan Sharma, B.Tech. IIT Jodhpur. *Thermoacoustic wave equation*. 2016. *Joined as graduate student at TU Munich, Germany.*
- 7 Prerna Patil, B.Tech. IIT Madras. *Towards a PSE-3D code*. 2016. *Joined as graduate student at Brown University, USA.*
- 8 Mayank Bajpayi, B.Tech. NIT Surat. *Wiener–Hopf solutions for edge tones*. 2016. *Joined as graduate student at Brown University, USA.*
- 9 Saikiran Gopalakrishnan, B.Tech. NIT Trichy. *Study of acoustic liners for jet engines*. 2015. *Co-supervisor: Prof. S. Gururaja. Joined as graduate student at Purdue University, USA.*
- 10 Monali Barbate, B.Tech. BITS Pilani. *Stability of rotating pipe flows*. 2014–15.
- 11 Tanya Pathak, B.Tech. Punjab Engg. College. *Instabilities in gas turbine combustors*. 2014.
- 12 Aman Narula, B.Tech. Amity University. *Noise from mixing layers*. 2013–14. *Joined as graduate student at Politecnico di Milano, Italy.*
- 13 Suhas Suresha, B.Tech. IIT Madras. *Analyzing open-source eigenvalue solvers*. 2013. *Joined as graduate student at Stanford University, USA.*
- 14 Dayasagar V. S., B.Tech. NIT Surathkal. *Post-processing of chevron jet data*. 2013. *Joined as graduate student at Chalmers University, Sweden.*