CURRICULUM VITAE

SAMVIT KUMAR

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EDUCATION

Ph. D.
Dissertation: **Effects of walls on turbulent flow: shear perturbations, momentum & vorticity cascades**
Advisors: Prof. Gregory Eyink and Prof. Charles Meneveau
Department of Mechanical Engineering,
Johns Hopkins University, USA
(2017 - 2023)

Master of Science in Engineering
Advisors: Prof. Charles Meneveau and Prof. Rajat Mittal
Department of Mechanical Engineering,
Johns Hopkins University, USA
(2017 - 2020)

Bachelor of Technology
Advisor: Prof. Sanjay Mittal
Department of Aerospace Engineering,
Indian Institute of Technology Kanpur, India
(2013-2017)

SERVICE

Reviewer, Journal of Fluid Mechanics
Served as a reviewer for submissions to JFM Rapids and JFM.

Proposal Reviewer, National Science Foundation - Division of Chemical, Bioengineering, Environmental and Transport Systems (ENG/CBET)
Served as part of a proposal review panel under program manager Dr. Ron Joslin.

AWARDS

Walter L. Robb Fellow Johns Hopkins University (2017 -2018)
Best Undergraduate Project Department of Aerospace Engineering, IIT Kanpur (2017)
Students-Undergraduate Research Graduate Excellence Fellow, IIT Kanpur (2015)

JOURNAL PUBLICATIONS

Kumar, Samvit, Simon Toedtli, Tamer Zaki, Gregory Eyink. ***Lighthill's Mechanism and vorticity cascade in the logarithmic layer of wall turbulence.*** Journal of Fluid Mechanics (2025)

Kumar, Samvit, Simon Toedtli, Tamer Zaki, Gregory Eyink. ***Josephson-Anderson relation as diagnostic of turbulent drag reduction by polymers*** Physical Review E (2025)

Kumar, Samvit and Gregory Eyink. ***A Josephson–Anderson relation for drag in classical channel flows with streamwise periodicity: Effects of wall roughness*** Physics of Fluids (2024, **Special Collection:** K. R. Sreenivasan: A Tribute on the occasion of his 75th Birthday). **Editor's Pick**

Kumar, Samvit, Charles Meneveau, and Gregory Eyink. ***Vorticity Cascade and turbulent drag in wall-bounded flows: plane Poiseuille flow*** Journal of Fluid Mechanics(2023). **Featured on journal cover.**

Kumar, Samvit, Charles Meneveau, and Gregory Eyink. ***Perturbative model for the second-order velocity structure function tensor in turbulent shear flows***. Physical Review Fluids (2022)

Eyink, Gregory L., Samvit Kumar, and Hao Quan. ***The Onsager theory of wall-bounded turbulence and Taylor's momentum anomaly***. Philosophical Transactions of the Royal Society A (2022)

Kumar, Samvit, Navrose, and Sanjay Mittal. ***Lock-in in forced vibration of a circular cylinder***. Physics of Fluids (2016)

Samvit Kumar, Navrose, and Sanjay Mittal, *Response to "Comment on 'Lock-in in forced vibration of a circular cylinder'" [Phys. Fluids 29, 109101 (2017)]*, Physics of Fluids (2017)

TEACHING EXPERIENCE

Instructor
Numerical Methods for Partial Differential Equations (Graduate course)
Department of Applied Mathematics & Statistics
Johns Hopkins University
(Spring 2025)

Teaching Assistant
Fluid Dynamics II
Instructor: Prof. Tamer Zaki
Department of Mechanical Engineering
Johns Hopkins University
(Spring 2020)

Teaching Assistant,
Undergraduate Fluids Lab
Instructor: Prof. Stephen Marra
Department of Mechanical Engineering
Johns Hopkins University
(Fall 2018)

CONFERENCE PUBLICATIONS

Kumar, Samvit, Rajat Mittal, and Charles Meneveau. ***Displacement thickness-based recycling inflow generation method for spatially developing turbulent boundary layer simulations***. 11th International Symposium on Turbulence and Shear Flow Phenomena (TSFP11, 2019), Southampton, United Kingdom

PROFESSIONAL EXPERIENCE

Postdoctoral Associate
Advisor: Prof. Lian Shen
Saint Anthony Falls Lab, University of Minnesota,
(Oct 2025 – present)

Postdoctoral Fellow
Advisor: Prof. Gregory Eyink
Department of Applied Mathematics and Statistics, Johns Hopkins University
(Oct 2023 – Oct 2025)

Graduate Research Assistant
Advisors: Prof. Gregory Eyink and Prof. Charles Meneveau
Department of Mechanical Engineering, Johns Hopkins University
(Jan 2021 – August 2023)

Graduate Research Assistant
Advisors: Prof. Charles Meneveau and Prof. Rajat Mittal
Department of Mechanical Engineering, Johns Hopkins University
(August 2018 – December 2020)

Research Intern
Advisor: Prof. Olivier Cadot
Institute of Mechanical Sciences and Industrial Applications,
École nationale supérieure de techniques avancées
Paris-Saclay, France
(May 2016 – July 2016)

Research Intern
Advisor: Prof. Sanjay Mittal
Computational Fluid Dynamics Lab,
Department of Aerospace Engineering,
Indian Institute of Technology Kanpur, India
(May 2015 – July 2015)

REFERENCES

Prof. Gregory Eyink
Department of Applied Mathematics and Statistics
Johns Hopkins University
Email: eyink@jhu.edu

Prof. Charles Meneveau
Department of Mechanical Engineering
Johns Hopkins University
Email: meneveau@jhu.edu

Prof. Tamer Zaki
Department of Mechanical Engineering
Johns Hopkins University
Email: t.zaki@jhu.edu

SOFTWARES AND SKILLS

Programming: MatLab, Python, Fortran, C++, OpenMPI, GitHub (version control)
Codes and Softwares: OpenFOAM, Vicar3d (in house), ANSYS-CFX, Tecplot, ParaView

CONFERENCE TALKS AND SEMINARS

Interact: Lighthill's mechanism and vorticity cascade in logarithmic layer of wall turbulence
Samvit Kumar, Simon Toedtli, Tamer Zaki, Gregory Eyink, Annual Meeting of the American Physical Society- Division of Fluid Dynamics (APS-DFD 2025), Houston, TX

Josephson-Anderson relation as diagnostic of turbulent drag reduction by polymers, Samvit Kumar, Simon Toedtli, Tamer Zaki, Gregory Eyink, Annual Meeting of the American Physical Society- Division of Fluid Dynamics (APS-DFD 2024), Salt Lake City, UT

Turbulent drag reduction due to polymer additives, the Josephson-Anderson relation and Lighthill's mechanism, Gregory Eyink, Samvit Kumar, Simon Toedtli, Tamer Zaki, APS March Meeting 2024, Minneapolis, MN

Instantaneous drag for flow through general curvilinear channels in terms of vortex dynamics: the Josephson-Anderson relation, Samvit Kumar, Gregory Eyink, APS-DFD 2023, Washington DC

Turbulent drag reduction due to polymer additives, vorticity dynamics, and Lighthill mechanism, Samvit Kumar, Simon Toedtli, Tamer Zaki, Gregory Eyink, APS-DFD 2023, Washington DC

The Josephson Anderson relation for wall drag in classical turbulent channel flows, Samvit Kumar, Charles Meneveau & Gregory Eyink, APS-DFD 2022, Indianapolis, IN

Onsager Approach to Wall Bounded Turbulence, Samvit Kumar, Hao Quan & Gregory Eyink, APS-DFD 2021, Phoenix, AZ

Displacement thickness-based recycling inflow generation method for spatially developing turbulent boundary layer simulations, Samvit Kumar, Rajat Mittal & Charles Meneveau, APS-DFD 2018, Atlanta, GA

Lightill's mechanism and vorticity cascade in logarithmic layer of wall turbulence: a study by conditional averaging, Samvit Kumar, Simon Toedtli, Tamer Zaki, Gregory Eyink, Simons Foundation Turbulence Seminar 2025, (Virtual)

Turbulent drag reduction due to polymer additives, the Josephson-Anderson relation and Lighthill's Mechanism, Samvit Kumar, Simon Toedtli, Tamer Zaki, Gregory Eyink, Simons Foundation Turbulence Seminar 2024, (Virtual)

Lighthill's up-gradient vorticity cascade in wall-bounded flows: plane Poiseuille flow, Samvit Kumar, Charles Meneveau, Gregory Eyink, Simons Foundation Turbulence Seminar 2023, (Virtual)