

Nek Sharan

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EDUCATION	Ph.D., Aerospace Engineering University of Illinois at Urbana-Champaign, USA <ul style="list-style-type: none">• Dissertation Topic: “Time-stable high-order finite difference methods for overset grids”• Advisors: Prof. Daniel J. Bodony & Prof. Carlos Pantano M. Tech. & B. Tech., Aerospace Engineering Indian Institute of Technology Bombay, India <ul style="list-style-type: none">• Dissertation Topic: “Numerical Simulation of Axisymmetric Jets”• Advisor: Prof. Avijit Chatterjee	December 2016 August 2011
PROFESSIONAL EXPERIENCE	Assistant Professor Department of Aerospace Engineering Auburn University, Auburn, AL, USA Postdoctoral Research Associate Computational Physics and Methods Group Los Alamos National Laboratory, Los Alamos, NM, USA Postdoctoral Scholar Graduate Aerospace Laboratories & Department of Mechanical and Civil Engineering California Institute of Technology, Pasadena, CA, USA Graduate Research Assistant Department of Aerospace Engineering University of Illinois at Urbana-Champaign, Urbana, IL, USA Analyst Modeling & Simulation Group Procter & Gamble Co., Bengaluru, India Research Assistant Department of Aerospace Engineering Indian Institute of Technology Bombay, Mumbai, India Assistant Engineer Thermodynamics and Combustion Technology FH Aachen - Aachen University of Applied Sciences, Aachen, Germany	August 2021 - Present April 2019 - August 2021 October 2016 - April 2019 August 2012 - September 2016 August 2011 - July 2012 July 2010 - June 2011 May 2009 - July 2009
PUBLICATIONS	N. Sharan , P. T. Brady and D. Livescu. High-order time-stable strong boundary conditions in finite-difference schemes solving hyperbolic systems. (Submitted). [Click here for preprint] N. Sharan and J. Bellan. Investigation of high-pressure turbulent jets using direct numerical simulation. <i>Journal of Fluid Mechanics</i> , 922 (2021): A24. N. Sharan , G. Matheou and P. E. Dimotakis. Turbulent shear-layer mixing: initial conditions, and direct-numerical and large-eddy simulations. <i>Journal of Fluid Mechanics</i> , 877 (2019): 35-81.	

N. Sharan, G. Matheou and P. E. Dimotakis. Mixing, scalar boundedness, and numerical dissipation in large-eddy simulations. *Journal of Computational Physics*, 369 (2018): 148-172.

N. Sharan, C. Pantano and D. J. Bodony. Time-stable overset grid method for hyperbolic problems using summation-by-parts operator. *Journal of Computational Physics*, 361 (2018): 199-230.

N. Sharan. Time-stable high-order finite difference methods for overset grids. *Doctoral Dissertation*, University of Illinois at Urbana-Champaign, 2016.

CONFERENCE
PROCEEDINGS

N. Sharan, M. Natarajan, P. T. Brady and D. Livescu. A deep learning framework for derivation of time-stable difference schemes, AIAA Paper 2021-2727, *AIAA Aviation 2021 Forum*.

N. Sharan and J. R. Bellan. Direct numerical simulation of high-pressure free jets, AIAA Paper 2021-0550, *AIAA Scitech 2021 Forum*.

N. Sharan, P. T. Brady and D. Livescu. Finite-difference Cartesian cut-cell method for hyperbolic systems, AIAA Paper 2021-0746, *AIAA Scitech 2021 Forum*.

N. Sharan and J. R. Bellan. Turbulent mixing in supercritical jets: effect of compressibility factor and inflow condition, AIAA Paper 2020-1156, *AIAA Scitech 2020 Forum*.

N. Sharan, P. T. Brady and D. Livescu. Stable and conservative boundary treatment for difference methods, with application to cut-cell discretizations, AIAA Paper 2020-0807, *AIAA Scitech 2020 Forum*.

N. Sharan and J. R. Bellan. Numerical aspects for physically accurate Direct Numerical Simulations of turbulent jets, AIAA Paper 2019-2011, *AIAA Scitech 2019 Forum*.

N. Sharan, C. Pantano and D. J. Bodony. Energy stable overset grid methods for hyperbolic problems. AIAA Paper 2014-2924, *7th AIAA Theoretical Fluid Mechanics Conference*.

N. Sharan and D. J. Bodony. High-order provably stable overset grid methods for block-structured adaptive mesh refinement. AIAA Paper 2013-2872, *21st AIAA Computational Fluid Dynamics Conference*.

N. Sharan and A. Chatterjee. Parallel Computation of Axisymmetric Jets. *Proceedings of the Python for Education and Scientific Computing (SciPy.in) 2010*.

TALKS

“High-pressure turbulent jet flows and non-dissipative methods for complex domains”, *Mechanical Engineering Graduate Seminar*, University of New Mexico, Albuquerque, February 2021 (**Invited**)

“Dimensionally-split provably stable cut-cell approach for flow calculations”, *73rd American Physical Society Division of Fluid Dynamics (APS DFD) Annual Meeting*, Chicago, November 2020

“Free-shear flow mixing computations: initial conditions, scalar boundedness and subgrid-scale effects”, *GALCIT Colloquium*, California Institute of Technology, Pasadena, May 2020 (**Invited**)

“High-order energy-stable boundary treatment for finite-difference cut-cell method”, *72nd American Physical Society Division of Fluid Dynamics (APS DFD) Annual Meeting*, Seattle, November 2019

“Direct numerical simulation of high-pressure mixing in turbulent jets”, *11th US National Combustion Meeting*, Pasadena, March 2019

“Stable, high-order methods for overset grids and turbulent mixing in large-eddy simulations”, Computational Physics and Methods (CCS-2), Los Alamos National Laboratory, Los Alamos, November 2018 **(Invited)**

“Low-dissipation methods for overset/AMR grids and scalar boundedness in turbulent mixing simulations”, Computational Engineering Division, Lawrence Livermore National Laboratory, Livermore, October 2018 **(Invited)**

“Effects of numerical dissipation and unphysical excursions on scalar-mixing estimates in large-eddy simulations”, *70th American Physical Society Division of Fluid Dynamics (APS DFD) Annual Meeting*, Denver, November 2017

“Time-stable and conservative high-order finite difference methods for overset grids”, *UIUC AE Department Seminar*, Urbana, April 2016.

“High-order provably stable overset grid methods for hyperbolic problems, with application to the Euler equations”, *68th American Physical Society Division of Fluid Dynamics (APS DFD) Annual Meeting*, Boston, November 2015

“Stable interface treatment in overset grid methods”, *67th American Physical Society Division of Fluid Dynamics (APS DFD) Annual Meeting*, San Francisco, November 2014.

“Intermittent Communication in Parallel Computation”, *23rd International Conference on Parallel Computational Fluid Dynamics*, Barcelona, May 2011.

“Axisymmetric Navier Stokes solver using Python and Cython”, *12th Annual CFD Symposium*, IISc Bangalore, August 2010.