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Education

PhD. Mechanical & Aerospace Engineering, Oklahoma State University, 2019 (expected). GPA - 4.0.

M.S. Mechanical & Aerospace Engineering, Oklahoma State University, 2015. GPA - 3.6.

B.E. Mechanical Engineering, BIT Mesra - India, 2012. GPA - 3.4.

Professional Experience

GRA - Computational Fluid Dynamics Laboratory, Oklahoma State University, 2016-present.

GRA - Computational Biomechanics Laboratory, Oklahoma State University, 2013-2015.

GTA - Mechanical & Aerospace Engineering, Oklahoma State University, 2013-present.

Design Engineer - Tata Technologies Limited, Pune, 2012-2013.

Research Interests

Data-driven turbulence modeling for large eddy simulations using deep artificial neural networks and symbolic system identification.

Nonlinear gradient based and gradient-free (evolutionary) optimization algorithms.

Numerical methods for reduced-order modeling.

Projects

Oklahoma NASA EPSCoR Grant: Blind deconvolution of turbulent flows.

DOE Career Award 2018: Physics-reinforced machine learning algorithms for multi-scale closure model discovery.

ASHRAE RP-1743 - Effect of inlet duct and damper design on ASHRAE 37/116 fan performance and static pressure measurements.

Publications

Journal Articles

1. **R. Maulik**, O. San, A. Rasheed, P. Vedula: Data-driven deconvolution for large eddy simulation of Kraichnan turbulence, *Physical Review E*, (under second review)

2. **R. Maulik**, O. San, A. Rasheed, P. Vedula: Subgrid modeling for two-dimensional turbulence using artificial neural networks, *Journal of Fluid Mechanics*, (accepted)

3. O.San, **R. Maulik**, M. Ahmed: An artificial neural network framework for reduced order modeling of transient flows, *Communications in Nonlinear Science and Numerical Simulation*, (accepted).

4. O.San, **R.Maulik**: Stratified Kelvin-Helmholtz turbulence of compressible shear flows, 2018, *Nonlinear Processes in Geophysics*, 25, 457–476.

5. **R.Maulik**, O.San: Numerical assessments of implicit LES and explicit filtering models for homogeneous isotropic turbulence, 2018, *Journal of Computational and Applied Mathematics* (accepted).

6. O.San, **R.Maulik**: Extreme learning machine for reduced order modeling of turbulent geophysical flows, 2018, *Physical Review E*,

7. O.San, **R.Maulik**: Machine learning closures for model order reduction of thermal fluids, 2018, *Applied Mathematical Modelling*, https://doi.org/10.1016/j.apm.2018.03.037.

8. **R.Maulik**, O.San, R. Behera : An adaptive multilevel wavelet framework for scale-selective WENO reconstruction schemes, 2018, *International Journal of Numerical Methods in Fluids*, https://doi.org/10.1002/fld.4489.

9. O.San, **R.Maulik**: Neural network closure models for nonlinear model order reduction, 2018, *Advances in Computational Mathematics*, https://doi.org/10.1007/s1044.

10. **R.Maulik**, O.San: A neural network approach for the blind deconvolution of turbulent flows, 2017, *Journal of Fluid Mechanics*, 831, 151-181.

11. **R.Maulik**, O.San: A novel dynamic framework for subgrid-scale parametrization of mesoscale eddies in quasigeostrophic turbulent flows, 2017, *Computers and Mathematics with Applications*, 74, 420-445.

12. **R.Maulik**, O.San: Explicit and implicit LES closures for Burgers turbulence, 2017, *Journal of Computational and Applied Mathematics*, 327, 12-40.

13. **R.Maulik**, O.San: Resolution and Energy Dissipation Characteristics of Implicit LES and Explicit Filtering Models for Compressible Turbulence, 2017, *Fluids*, 2(2)-14.

14. **R.Maulik**, O.San: A stable and scale-aware dynamic modeling framework for subgrid-scale parameterizations of two-dimensional turbulence, 2016, *Computers & Fluids* 158, 11-38.

15. **R.Maulik**, O.San: A dynamic subgrid-scale modeling framework for Boussinesq turbulence, 2017, *International Journal of Heat and Mass Transfer*, 108, 1656-1675.

16. **R.Maulik**, O.San: A dynamic framework for scale-aware parameterizations of eddy viscosity coefficient in two-dimensional turbulence, 2017, *International Journal of Computational Fluid Dynamics*, 31(2), 69-92.

17. **R.Maulik**, O.San: Dynamic modeling of the horizontal eddy viscosity coefficient for quasigeostrophic ocean circulation problems, 2016, *Journal of Ocean Engineering and Science* 1, 300-324.

18. H. H. Marbini, **R. Maulik**: A biphasic transversely isotropic poroviscoelastic model for the unconfined compression of hydrated soft tissue, 2016, *Journal of Biomechanical Engineering* 138, 031003.

Contributed Talks

1. **R.Maulik**, O.San, C. Bach: A computational investigation of the effect of ground clearance in vertical ducting systems, 2018, Purdue University, Herrick Labs Conferences 2018.
2. **R.Maulik**, O.San, P. Vedula: Deep learning of subfilter scale stress for large eddy simulation, 38^{th} AIAA-ASME Symposium, Oklahoma Christian University, 2017.
3. **R.Maulik**, O.San: A neural network approach for the blind deconvolution of turbulent flows, Bulletin of the American Physical Society 70, 2017.
4. **R.Maulik**, Ratikanta Behera, O.San: A generalized wavelet based grid-adaptive and scale-selective implementation of WENO schemes for conservation laws, Texas Applied Mathematics and Engineering Symposium 2017, The University of Texas, Austin.
5. **R.Maulik**, O.San, R. Behera: An implicit large eddy simulation framework based on wavelet adaptive mesh refinement, 37^{th} AIAA-ASME Symposium, Oral Roberts University, 2017.
6. **R.Maulik**, O.San: An explicit filtering framework based on Perona-Malik anisotropic diffusion for shock capturing and subgrid scale modeling of Burgers' turbulence, Bulletin of the American Physical Society 69, 2016.
7. **R.Maulik**, O.San: A dynamic hybrid subgrid-scale modeling framework for large eddy simulations, Bulletin of the American Physical Society 69, 2016.
8. O.San, **R.Maulik**: A dynamic framework for subgrid-scale parametrization of mesoscale eddies in geophysical flows, Bulletin of the American Physical Society 69, 2016.
9. **R.Maulik**, O.San: Evaluation of explicit and implicit LES closures for Burgers' turbulence, 36^{th} AIAA-ASME Symposium, University of Oklahoma, 2016.

Honors & Awards

SIAM Student Travel Award: 2019 SIAM Conference on Computational Science and Engineering, Spokane, WA, 2019.

Invited participant, Advances in PDEs: Theory, Computation and Application to CFD, ICERM, Brown University, RI, 2018

Outstanding Graduate Student, College of Engineering Architecture and Technology, Oklahoma State University, 2018

Graduate College Robberson Summer Research Fellowship, Oklahoma State University, 2017

NSF Scholarship, SDSC Summer program in HPC and Data Science, UC San Diego, 2017

FGSA Travel Award for Excellence in Graduate Research, American Physical Society, 2017

SIAM TX-LA Travel Grant, Texas Applied Mathematics and Engineering Symposium, 2017

Graduate Student Travel Grant, American Physical Society - Division of Fluid Dynamics, 2017

Graduate Student Travel Grant, Graduate Program Student Government Authority, Oklahoma State University, 2017

John Brammer Fellowship, Oklahoma State University, 2016

Graduate College Top Tier Fellowship, Oklahoma State University, 2016

Professional Service

Session chair - 38th Oklahoma AIAA-ASME Symposium, Oklahoma Christian University, 2018.

Organizer & Lecturer - 2-day TensorFlow workshop, Mechanical & Aerospace Engineering, 2018

Organizer - National Lab Day outreach, Computational Fluid Dynamics Laboratory, Oklahoma State University 2017,2018.

References

Dr. Omer San, Assistant Professor, Oklahoma State University. Email: `osan@okstate.edu`.

Dr. Prakash Vedula, Associate Professor, University of Oklahoma. Email: `pvedula@ou.edu`

Dr. Ayaboe Edoh, Research Scientist, The Air Force Research Laboratory. Email: `acedoh@gmail.com`

Dr. Christian Bach, Assistant Professor, Oklahoma State University. Email: `cbach@okstate.edu`