Romit Maulik

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Education

PhD. Mechanical & Aerospace Engineering, Oklahoma State University, 2019.

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

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

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

Physics-informed machine learning for turbulence modeling in LES/RANS.

Non-convex optimization.

Numerical methods for reduced-order modeling.

High-performance computing.

Project contributions

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. 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*, (forthcoming).
2. **R.Maulik**, O.San: Numerical assessments of a parametric implicit large eddy simulation model, *Journal of Computational and Applied Mathematics* (forthcoming).
3. **R. Maulik**, O. San, A. Rasheed, P. Vedula: Subgrid modeling for two-dimensional turbulence using artificial neural networks, *Journal of Fluid Mechanics*, 858, 122-144, 2019.
4. **R. Maulik**, O. San, A. Rasheed, P. Vedula: Data-driven deconvolution for large eddy simulation of Kraichnan turbulence, *Physics of Fluids*, 30, 125109, 2018.
5. O.San, **R.Maulik**: Stratified Kelvin-Helmholtz turbulence of compressible shear flows, *Nonlinear Processes in Geophysics*, 25, 457–476, 2018.
6. O.San, **R.Maulik**: Extreme learning machine for reduced order modeling of turbulent geophysical flows, *Physical Review E*, 97, 042322, 2018.
7. O.San, **R.Maulik**: Machine learning closures for model order reduction of thermal fluids, *Applied Mathematical Modelling*, https://doi.org/10.1016/j.apm.2018.03.037, 2018.
8. **R.Maulik**, O.San, R. Behera : An adaptive multilevel wavelet framework for scale-selective WENO reconstruction schemes, *International Journal of Numerical Methods in Fluids*, https://doi.org/10.1002/fld.4489, 2018.
9. O.San, **R.Maulik**: Neural network closure models for nonlinear model order reduction, *Advances in Computational Mathematics*, https://doi.org/10.1007/s1044, 2018.
10. **R.Maulik**, O.San: A neural network approach for the blind deconvolution of turbulent flows, *Journal of Fluid Mechanics*, 831, 151-181, 2017.
11. **R.Maulik**, O.San: A novel dynamic framework for subgrid-scale parametrization of mesoscale eddies in quasigeostrophic turbulent flows, *Computers and Mathematics with Applications*, 74, 420-445, 2017.
12. **R.Maulik**, O.San: Explicit and implicit LES closures for Burgers turbulence, *Journal of Computational and Applied Mathematics*, 327, 12-40, 2017.
13. **R.Maulik**, O.San: Resolution and Energy Dissipation Characteristics of Implicit LES and Explicit Filtering Models for Compressible Turbulence, *Fluids*, 2(2)-14, 2017.
14. **R.Maulik**, O.San: A dynamic subgrid-scale modeling framework for Boussinesq turbulence, *International Journal of Heat and Mass Transfer*, 108, 1656-1675, 2017.
15. **R.Maulik**, O.San: A dynamic framework for scale-aware parameterizations of eddy viscosity coefficient in two-dimensional turbulence, *International Journal of Computational Fluid Dynamics*, 31(2), 69-92, 2017.
16. **R.Maulik**, O.San: A stable and scale-aware dynamic modeling framework for subgrid-scale parameterizations of two-dimensional turbulence, *Computers & Fluids* 158, 11-38, 2016.
17. **R.Maulik**, O.San: Dynamic modeling of the horizontal eddy viscosity coefficient for quasigeostrophic ocean circulation problems, *Journal of Ocean Engineering and Science* 1, 300-324, 2016.
18. H. H. Marbini, **R. Maulik**: A biphasic transversely isotropic poroviscoelastic model for the unconfined compression of hydrated soft tissue, *Journal of Biomechanical Engineering* 138, 031003, 2016.

Contributed talks

1. **R.Maulik**, O.San, A. Rasheed, P. Vedula: Data-driven deconvolution for the sub-grid modeling of large eddy simulations of two-dimensional turbulence, SIAM-CSE, 2019.
2. **R.Maulik**, O.San, A. Rasheed, P. Vedula: Data-driven deconvolution for the large eddy simulation of Kraichnan turbulence, Bulletin of the American Physical Society 71, 2018.
3. **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.
4. **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.
5. **R.Maulik**, O.San: A neural network approach for the blind deconvolution of turbulent flows, Bulletin of the American Physical Society 70, 2017.
6. **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.
7. **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.
8. **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.
9. **R.Maulik**, O.San: A dynamic hybrid subgrid-scale modeling framework for large eddy simulations, Bulletin of the American Physical Society 69, 2016.
10. 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.
11. **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

Best oral presentation, 2^{nd} MAE Graduate Research Symposium, Oklahoma State University, 2018

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

Invited participant, 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 & outreach

Peer-reviewer - Computer Physics Communications, International Journal of Computational Fluid Dynamics.

Session chair - SIAM Conference on Computational Science and Engineering, Spokane, WA, 2019.

Session chair - 2nd MAE Graduate Research Symposium, Oklahoma State University, 2018.

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.