



ME Seminar



Data-driven turbulence and transition model development for gas turbine applications

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ABSTRACT

Turbulence modeling is the workhorse of any design industry. However, these models lack the accuracy of physics-rich high-fidelity simulations. With the increase in the power of computing, high-fidelity multi-physics simulations are becoming increasingly commonplace, but they are still not feasible as an iterative industrial design tool. Therefore, in order to bridge the gap between the accuracy of high-fidelity simulations and turbulence models, certain high-fidelity data sets can be harvested in order to extract meaningful physics-based insight with novel machine learning processes to improve the accuracy low-fidelity calculations. In this talk, Dr. Harshal will showcase how a CFD-driven multi-expression multi-objective gene expression programming algorithm can be used to improve the accuracy in prediction of wake turbulence and separation induced transition for low and high pressure turbines. The models developed have proven to be effective across a number of operating conditions demonstrating their robustness.

ABOUT THE SPEAKER



Dr. Harshal Akolekar is currently an Assistant Prof. in the Department of Mechanical Engineering and School of AI and Data Science, IIT Jodhpur. Prior to joining IIT, Jodhpur he worked with the DST Group, Melbourne Australia. He completed his ME and PhD in machine-learning based computational fluid dynamics (CFD) for low pressure turbines from the University of Melbourne, Australia in 2019, in collaboration with GE, Aviation. He currently develops turbulence and transition models using novel machine learning tools such as evolutionary and deep learning algorithms to improve the accuracy of low-fidelity gas turbine CFD. He is an undergraduate in mechanical engineering from BITS, Pilani.

**November 4, 2023 (Friday)
4:00 PM, A.R. Auditorium**