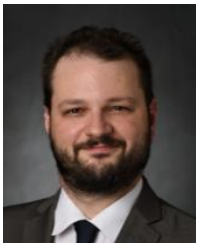
Quantum Computing for CFD: Panel Discussion at FEDSM25

Quantum computing is an emerging new paradigm of computing. Quantum computing offers high speeds and memory to become the new tool for high performance computing. Quantum computing uses Qubits to manipulate information and perform scientific computing. However, the technology is very much in infancy and significant research and progress needs to be made before it can become a common computing environment. The purpose of this panel is to discuss the status of this technology through the eyes of a computer scientist, a fluid dynamics expert, and a small business entrepreneur. The panel will be moderated by Professors Pratap Vanka of UIUC and Elia Merzari of Penn State University.

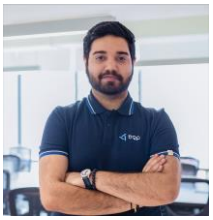
Pratap Vanka is Professor Emeritus in the Department of Mechanical Science and Engineering, UIUC. He has pioneered several numerical algorithms including multigrid methods, Lattice Boltzmann methods, meshless techniques, GPU computing, and partially parabolic methods. He is a Life Fellow of ASME, Fellow of APS, Associate Fellow of AIAA, Fellow of ASTFE and recipient of several teaching and research awards including the ASME Freeman Scholar lecture award.



Elia Merzari is a professor at the Department of Nuclear Engineering at Penn State University. He served in various roles at Argonne National Laboratory between 2009 and 2019. His expertise covers modeling and simulation of advanced reactors including safety analysis. He has received several awards in HPC, including the ANS Landis Young Member Engineering Achievement Award, and the ASME George Westinghouse Silver Medal. He is a Fellow of ASME and ANS.

Panelists

Gushu Li is an Assistant Professor in Computer and Information Science at the University of Pennsylvania. He leads the Penn Quantum System Lab, where he focuses on critical quantum computing problems. His research objective is to understand and develop powerful quantum computer systems by combining theoretical foundations and practical implementation. His research has been widely recognized by the community, including a Distinguished Paper Award at OOPSLA'20 and an NSF Quantum Information Science and Engineering Network (QISE-NET) Triplet Fellowship Grant. His research output has been adopted by several industry and academia quantum software frameworks and widely used in the community. He has won several awards including Intel Rising Star Faculty Award, NSF Faculty Early CAREER award, NSF (QISE-NET) Award and others



Abhishek Chopra is the Founder and CEO of BQP, a cutting-edge deep tech company advancing the application of quantum computing to engineering simulations, with a strong emphasis on Computational Fluid Dynamics (CFD). At the intersection of computational sciences, quantum technology, and entrepreneurship, Abhishek is driving the development of next-generation simulation tools tailored for mission-critical industries. Under his leadership, BosonQ Psi has raised over $7 million in venture capital and government funding and formed strategic collaborations with industry and research leaders such as the Air Force Research Laboratory, Moog, IAI North America, IBM, and Intel. Abhishek's work exemplifies the next generation of engineering leadership, championing the integration of quantum computing with CFD simulations of industrial significance.

Peyman Givi is Distinguished Professor and the James T. MacLeod Chair in Mechanical Engineering at the University of Pittsburgh. Previously he was the SUNY Buffalo Distinguished Professor of Aerospace Engineering. He has also worked at Flow Research Company, with frequent visiting appointments at the NASA Langley & Glenn research centers. Peyman is one of the original developers of DNS of turbulent reacting flows and pioneered the filtered density function (FDF) method for LES of such flows. Peyman is also one of the very first who introduced quantum computing (QC) for computational fluid dynamics, and he has been utilizing a variety of QC methods for DNS and LES. Givi is Fellow of ASME, AIAA, APS and the Combustion Institute.