ICTAS NEW HORIZONS SEMINAR SERIES

Predicting Turbofan Fan-Stage Broadband Noise

On approach when a commercial aircraft's engines are throttled down, the fan stage becomes the main engine noise source. The noise exists mainly due to the interaction of the fan rotor wake with the fan exit guide vanes (FEGVs). Both tonal and broadband noise is produced. We have developed a computational hybrid method that can be used during the design phase to predict the broadband interaction noise. A low-order cascade response solution forms the backbone of the RSI (rotor-stator interaction) method that will be discussed. Input to RSI consists of rotor wake properties currently taken from either experimental data or a Reynolds Averaged Navier Stokes (RANS) flow simulation. The basis for and outcomes of modeling choices made within the RSI framework will be presented. Comparison between measured and predicted noise levels indicates the method can provide the trend prediction necessary for design.

ABOUT THE SPEAKER

Sheryl Grace, Associate Professor
Department of Mechanical Engineering
Boston University

Professor Grace's research interests lie in the fields of unsteady aerodynamics and aeroacoustics. She has twice been invited to lecture at the von Karman Institute for Fluid Dynamics as part of the Aeroacoustics series. She has made contributions to her field through her work on inverse methods for source/disturbance identification and investigations of aperture and cavity flows. In the past she has received funding from both GEAE and Boeing for work related to aircraft and engine noise. Currently, she is funded by the Aeroacoustics Research Consortium to benchmark existing, and develop alternative, methods for utilizing CFD in the prediction of fan noise.

Beyond her research and teaching, Professor Grace is a past faculty advisor for the student chapter of AIAA at Boston University, for which she won the National Faculty Advisor Award. She has worked on numerous outreach activities for K-12. She was instrumental in founding the Women in Science and Engineering Committee at Boston University, was Co-PI on an NSF ADVANCE PAID grant, and continuously works to improve recruitment and retention of women in science and engineering. She also contributes to society at large as exemplified by her recent service to the Massachusetts Department of Environmental Protection and to the Canadian Research Council as a member of expert panels reviewing the health impacts of wind turbines. Prior to joining BU she earned her PhD in aerospace engineering at The University of Notre Dame, an MS in Applied Mathematics at Oklahoma State University, and a BS in mathematics at the University of Akron.

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1 pm, 310 Kelly Hall

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