



Texas Tech University

**PRESIDENTS' DISTINGUISHED LECTURE SERIES
IN ENGINEERING, SCIENCE, AND MEDICINE**

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**“High Reynolds number flows, the atmospheric boundary layer, and
wind turbines”**

Abstract

The flow over large vehicles, such as ships, submarines, and airplanes are typified by high Reynolds number flows. This is also true for the atmospheric boundary layer (ABL), and so the understanding of turbulence at high Reynolds number is crucial to the prediction of many important flows. We use pipe and boundary layer flow measurements over a very large Reynolds number range to examine scaling behaviors, and show that at sufficiently high Reynolds number these flows reveal both expected and unexpected implications for our understanding and our capacity to model turbulence. We have also examined the effects of stable stratification on turbulent transport, which reflects the behavior of the nighttime ABL, and methods for experimentally modeling the performance of wind turbines, and their interaction with the ABL.

Bio

Dr. Smits is the Eugene Higgins Professor of Mechanical and Aerospace Engineering at Princeton, as well as a Professorial Fellow at Monash University in Australia. His research interests are centered on fundamental,



experimental research in turbulence and fluid mechanics. In 2004, Dr. Smits received the Fluid Dynamics Award of the American Institute of Aeronautics and Astronautics (AIAA). In 2007, Dr. Smits received the Fluids Engineering Award from the American Society of Mechanical Engineers (ASME), the Pendray Aerospace Literature Award from the AIAA, and the President's Award for Distinguished Teaching from Princeton University. In 2014, he was also awarded the Aerodynamic Measurement Technology Award from the AIAA. He is a Fellow of the American Physical Society, the American Institute of Aeronautics and Astronautics, the American Society of Mechanical Engineers, the

American Academy for the Advancement of Science, the Australasian Fluid Mechanics Society, and he is a Member of the National Academy of Engineering. He recently became the Editor-in-Chief of the AIAA Journal.

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