



TEXAS TECH UNIVERSITY

Wind Science & Engineering
Research Center™

Wednesday, March 21, 2012
3:30 p.m. to 4:30 p.m.
EE Rm 217
Reception to follow

The McDonald-Mehta Lecture Series Presents:

Simulation of Transient Winds and Their Effects on Civil Structures

Partha P. Sarkar, Ph.D.

Professor and Director, Wind Simulation and Testing Laboratory
Iowa State University

The Wind Simulation and Testing (WiST) Laboratory at Iowa State University (ISU) was completed in 2005 to study basic fluid-structure interaction problems and those related to wind engineering. The WiST Lab (12,000 sq. ft on 2 floors) houses several “advanced or next generation” wind tunnel facilities that simulate straight-line winds and gusts, tornado-like vortices, microburst winds and aeroelastic (motion-dependent) wind loading effects. In this presentation, results of flow field and wind loads from wind effects on civil structures (such as buildings, long-span bridges and grain-bin structures) in a tornado, a microburst and gust-front winds will be presented. The velocity fields in tornado and microburst are three dimensional and the structural loading effects they produce are transient in nature, and can produce much higher peak loads than the design wind loads. While laboratory simulations can reproduce the most important features of these wind phenomena, it was found that numerical simulations can overcome some of their physical limitations. Further, it will be shown how a combination-approach of using Finite Element Analysis and laboratory simulations can help understand the interaction of a building with a tornado. Interference effects of surrounding structures on wind loads and effect of ground roughness on tornado flow field will be also mentioned.

Dr. Partha P. Sarkar is a professor in the Department of Aerospace Engineering at Iowa State University, where he has established an internationally recognized wind engineering and experimental aerodynamics program. He held the T.A. Wilson endowed chair from 2000-2008 and is also the Director of ISU’s Wind Simulation and Testing Laboratory, which he helped to establish. Before joining ISU in 2000, he taught for eight years in the Department of Civil Engineering at Texas Tech University where he was associated with its Wind Science and Engineering Research Center.

Dr. Sarkar earned Ph.D. at Johns Hopkins University in 1992, M.S. at Washington State University in 1986, and B.Tech from IIT, Kanpur in 1985; all his degrees are in civil (structures) engineering. His research interests are in wind engineering and wind energy, mainly in the assessment of wind loads on buildings and flexible structures such as long-span bridges, tall buildings and wind turbine components using wind tunnel modeling.

Dr. Sarkar’s research has resulted in more than 120 published articles with more than a third of those in journals, four US patents and international collaborations. He is also credited for the design and construction of the unique wind tunnel facilities at Iowa State University. He has served on ASCE national committees and he is currently serving as the president of AAWE (American Association for Wind Engineering). He has been a guest professor at Tokyo Polytechnic University for the past 4 years.