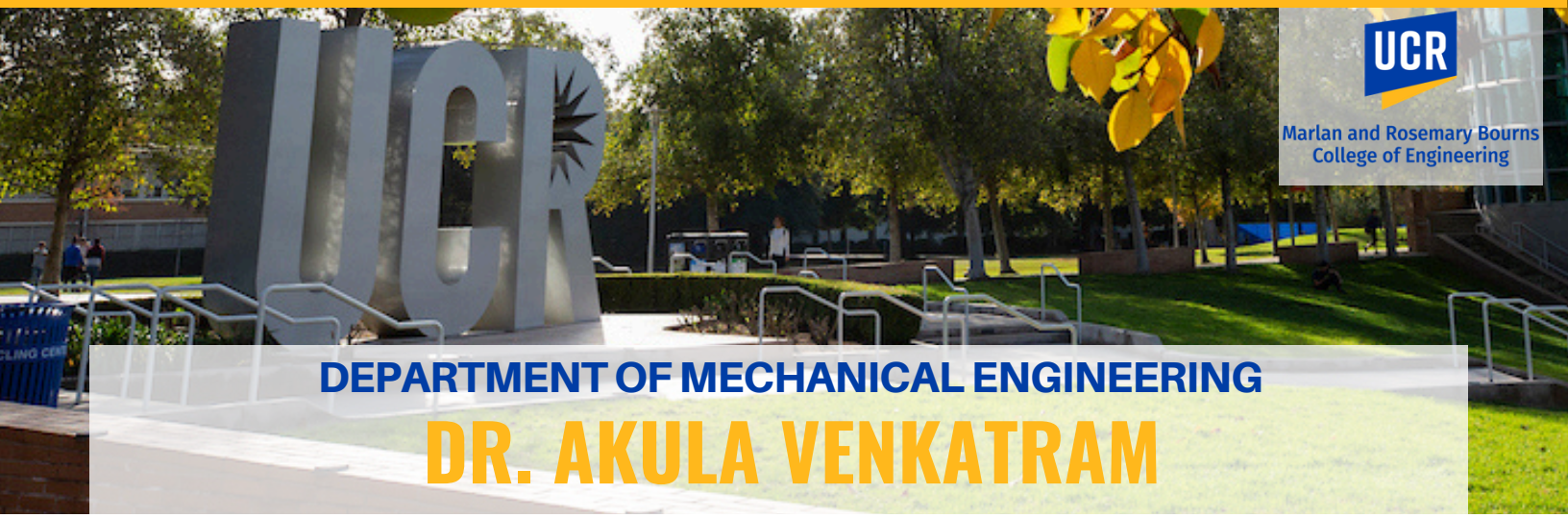

UCR
Marlan and Rosemary Bourns College of Engineering

DEPARTMENT OF MECHANICAL ENGINEERING

DR. AKULA VENKATRAM

FIFTY YEARS IN AIR POLLUTION MODELING: A PERSONAL JOURNEY

This talk reflects on my fifty years of work in air pollution modeling, beginning with my early interest in atmospheric turbulence and transport in the boundary layer and continuing through research and regulatory applications involving industrial sources, highways, airports, shoreline environments, and urban air pollution. Over the course of my career, I have been interested in a central question: how can we represent the complex processes governing atmospheric dispersion in models that are both scientifically defensible and practical for real-world applications? The presentation will describe how this question shaped my work on plume dispersion, internal boundary layers, line-source modeling, plume rise, deposition, and near-road air quality. I will discuss the progression of air pollution models from relatively simple analytical formulations to modern modeling systems that incorporate detailed descriptions of meteorology, turbulence, urban geometry, and chemistry. Particular attention will be given to my work related to highway dispersion, roadway barriers, urban dispersion, and the development and evaluation of regulatory models such as AERMOD. The talk will also describe the important role that field observations played in shaping my research. Many advances in my work resulted from efforts to understand differences between model predictions and measurements obtained in field studies. These experiences reinforced the importance of combining physical insight with careful model evaluation. Throughout the presentation, I will reflect on the influence of students, collaborators, and interdisciplinary interactions on my career. I will also discuss how the field itself has evolved over the last five decades—from hand calculations and limited datasets to modern computational models supported by extensive measurements and advanced computing resources. The presentation concludes with thoughts on the continuing challenges in air pollution modeling, particularly in predicting human exposure in complex urban environments, and on the enduring importance of simplified physical models in understanding atmospheric transport and dispersion.

Dr. Akula Venkatram is a Distinguished Professor of Mechanical Engineering at the University of California, Riverside, California, USA. His research is focused on the development and the application of models for the transport and dispersion of air pollutants over urban and regional scales. Dr. Venkatram co-edited and contributed to the "Lectures on Air Pollution Modeling" published by the American Meteorological Society. He was member of the team that developed AERMOD, which is used by the USEPA to regulate emissions from a variety of sources. He is the recipient of the inaugural award from the AMS Committee on Meteorological Aspects of Air Pollution for "contributions to the field of air pollution meteorology through the development of simple models in acid deposition, ozone photochemistry and urban dispersion". His research on modeling the air quality impact of transport related emissions was recognized in 2010 by the United States Environmental Protection Agency, through a Scientific and Technological Achievement Award for "expanding and improving the scientific and regulatory communities' ability to assess the impacts of mobile source emissions". His research on this topic is summarized in the monograph "Urban Transportation and Air Pollution" https://www.amazon.com/Urban-Transportation-Pollution

LOCATION

Winston Chung Hall
Room 205/206

www.me.ucr.edu

DATE AND TIME

Thursday, May 28, 2026
11:00AM - 12:00PM