DEPARTMENT OF MECHANICAL ENGINEERING
Purdue School of Engineering and Technology

FALL 2007 SEMINAR SERIES

Date: Thursday, October 11, 2007
Time: 11:00 am - 12:00 pm
Room: SL 165
Reception at 10:45 am (cookies and refreshments served)
Everyone is invited

Environmental Airflow Modeling using CFD: Applications and Opportunities

Dr. Erdal Yilmaz, Senior Research Associate, Computational Fluid Dynamics Lab, IUPUI, Indianapolis, IN

Abstract. Implications of the global warming and alarming level of pollution and toxicity in the air, once ignored for the sake of industrialization, have been serious concern of the society, governments, corporations, and institutions. Studies have been performed at different levels for last couple of decades. Regional models for the air quality are based on low fidelity models, such as using Gaussian based approaches, due to low computational power requirements. High fidelity modeling in environmental air quality predictions, such as using Computational Fluid Dynamics (CFD) modeling, is a growing trend with the availability of the computational modeling tools in high performance computing platforms. Though it is still in local scale (1-4 square miles) with fine resolution, soon we will see regional CFD capabilities. CFD now can be used to model variety of environmental problems. Health effects of the pollutants especially sub micron particulate matters from moving, point, and area sources have been identified as causes of serious health problems. Another growing opportunity is on environmentally friendly urban wind energy applications. Modeling the wind map of the urban environment will allow efficient use of the urban wind turbines hence reducing the pollutant and toxic emissions. Effect of the building topology on the wind patterns in the urban areas is very important for "a city breathing well." Building canyons may induce even higher wind pressure on the building if the canyon's topology is not arranged accordingly. It may even cause serious physical damage.

This presentation will address environmental CFD studies in the CFD lab. A case study of the downtown Indianapolis will be presented. Opportunities regarding CFD modeling will be highlighted.

About the Speaker. Dr. Erdal Yilmaz graduated from the Middle East Technical University (METU) in Turkey with a Bachelor of Science degree in Aeronautical Engineering in January 1990. He received his MS and PhD degrees from the same department in 1994 and 2000 respectively. He worked in different institutes of the Scientific and Technical Research Council of Turkey, (TÜBITAK- about 2000 employees) from 1990-1999 as CFD development engineer, project engineer, and design engineer. He received job training on the aerodynamic design of aircrafts at CASA-currently EADS/Airbus in 1993. He received another job training on helicopter performance, dynamics, and acoustics analysis at Sikorsky Aircraft Company, USA in 1997. He is currently working in CFD Laboratory in Purdue School of Engineering and Technology in IUPUI as senior research associate. His research interest includes CFD, parallel computing, aerodynamics (airplane, missiles, cars, buildings…), and air quality modeling. He got MBA degree from Kelley School of Business in Indiana University in 2003.