2008-2009

Graduate Seminar Series

The Department of Mechanical Engineering – Engineering Mechanics

Proudly Presents

Professor Dale R. Tree

Brigham Young University

Dale Tree is a Professor of Mechanical Engineering at Brigham Young University. His research activities include: the measurement and modeling of soot and NO_X formation in both coal and diesel combustion, ash deposition and corrosion in coal and biomass fired systems, full-scale boiler measurements, and combustion diagnostics. Dr. Tree received a B.S. degree from Brigham Young University, an M.S. from Purdue, and a Ph.D. from the University of Wisconsin-Madison. In addition to 14 years at Brigham Young, Dr. Tree worked for two years at Cummins Engine Company and completed a one year sabbatical at Sandia National Laboratories. Dr. Tree is the author or coauthor of approximately 60 technical articles and has received five department and two college teaching awards.

Dr. Tree grew up in West Lafayette, Indiana. He is married to Karen Porter from Portland, Oregon. They have six children, three boys and three girls, with three of them currently attending BYU. Dr. Tree likes fishing and golf and plays basketball three times a week for exercise.

Thursday, Oct. 16, 2008 3:00 – 4:00 p.m. Room 112, ME-EM Bldg.

Oxy-combustion – An Enabling Technology For CO_2 Sequestration and Its Role in Reducing Coal-Fired NO_X Emissions

Inexpensive, clean, and sustainable energy is one of if not the largest engineering challenge of the 21st century. Over the past three decades enormous progress has been realized in reducing harmful pollutants such as NO_X, SO_X and particulate in both the stationary and mobile energy sector. While these efforts continue, an even more daunting engineering challenge exists to reduce global CO_2 emissions and other greenhouse gasses. The normally risk averse and technologically stagnant utility industry has recently awaken to this challenge and is proposing a solution for clean electricity from coal at equal or higher overall thermodynamic efficiencies than currently functional boiler. The process includes ultra-supercritical boilers with CO_2 capture and sequestration using oxy-combustion. In order to implement this strategy companies need only employ existing technologies for which they already maintain technical expertise and strong partnerships. In addition to enabling carbon capture, oxy-combustion introduces a new design variable into the combustion process that enables additional performance improvements. One such improvement is the reduction of NO_X emissions. An explanation of NO_X formation in pulverized coal-fired boilers and a detailed investigation of the mechanisms of oxy-combustion that produce improved NO_X emissions will be presented.

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