2023

해외석학 초청강연

BK21 FOUR Aerospace Distinguished Lecture Series

Date 4/11(TUE) 10:30~11:30

Venue Rm.1313.Bldg.301

Lecture #1

Chemical Kinetics Experiments for Hydrocarbon Oxidation and Ammonia Using a Shock Tube

Speaker

Professor. Eric L. Petersen

- Dr. Petersen is presently a Professor and holder of the Nelson-Jackson Chair in the J. Mike Walker '66 Department of Mechanical Engineering at Texas A&M University (TAMU). He is currently the Director of the TEES Turbomachinery Laboratory and the President of IDERS (Institute for Dynamics of Explosions and Reactive Systems). He received his Ph.D. from Stanford University (1998), his M.S. from the University of Florida (1990), and his B.S. from the University of Central Florida (1988), all in Mechanical Engineering.

Abstract

Over the past few years, the Petersen Research Group has been active in the study of combustion chemistry using a combination of flame and shock-tube experiments. Recent studies have focused on the chemical kinetics of ammonia and on the oxidation of hydrocarbons. Over the past decade, research activity on NH3 combustion has boomed, due to the potential of NH3 as a hydrogen carrier and as a fuel itself. Nonetheless, we have shown that there is still significant variation among the predictions of modern chemical kinetics mechanisms over the range of available data and target conditions. We have developed a laser absorption diagnostic for detecting NH3 which is used to measure ammonia concentration time histories in a shock tube and also to accurately measure the amount of NH3 present initially in a given experiment. Recent data have been used to produce an updated kinetics mechanism for ammonia pyrolysis. Laser absorption measurements of other key combustion species such as CO and H2O have also been used in shock-tube experiments in collaboration with C. K. Westbrook to better understand the oxidation of the pentene isomers. The high-temperature shock-tube data have led to the first comprehensive study of all 5 isomers and a corresponding chemical kinetics mechanism that is able to model the effect of C=C double bond location on the relative reactivity of the isomers. A brief overview of the TEES Turbomachinery Laboratory is also provided.

Moderator 여재익교수(jjyoh@snu.ac.kr)