PURDUE UNIVERSITY

School of Aeronautics and Astronautics

The AAE Fall 2009 Colloquium Series

COLLOQUIUM

Some Aspects of Rheological, Flow and Spray Characteristics of Gel Fuels with Regard to Propulsion Applications

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3:30 P.M.
ARMS 1021

Abstract

Gelled fuels and propellants are of interest for rocket and ramjet propulsion systems, because of their safety and performance benefits. Due to their shear-rate dependent non-Newtonian flow behavior, they offer the possibility to build throttleable engines, which have similar simple handling characteristics like engines with solid fuels.

The presentation will give information on several aspects of rheological, flow and spray characteristics of gel fuels. It includes the description of the shear viscosity dependence of the shear viscosity of gel fuels by an extended version of the Herschel-Bulkley equation, the determination of elongational viscosities and the characterization of the flow behavior of gels in tubes of constant diameter by a generalized Reynolds number and a critical Reynolds number. The spray behavior of various droplet forming gels will be characterized by a regime diagram with generalized Reynolds and Weber numbers.

Bio

Dr.-Ing. Helmut K. Ciezki received his PhD. from the Technical University of Aachen, Germany, in 1990. In 1991 he became the Head of the Ramjet Propulsion Group at the German Aerospace Center (DLR), Space Propulsion Institute and since 2000 has also been head of the Phys.-Chem Laboratories Group at the Institute. Since 2008, Dr. Ciezki has also served as Lecturer at the University of Cooperative Education at Mosbach. His current areas of interest include multiphase combustion and mixing processes; gel propulsion; particle combustion; ramjet, scramjet, and solid rocket combustion processes; self-ignition processes; flow visualization techniques; intrusive probes.

An informal coffee & cookie reception will be held prior to the lecture at 3:00 p.m. in the AAE/ARMS undergraduate lounge (directly in front of ARMS 3rd floor elevators).