Apr 11th, 2007 - 11:45 AM

Dynamic thin film measurement data analysis method

Nathaniel Wilke
Missouri University of Science and Technology

Nathaniel Wilke

Department: Mechanical and Aerospace Engineering
Major: Mechanical Engineering
Faculty Advisor(s): Dr. James Drallmeier
Advisor's Department: Mechanical and Aerospace Engineering

Funding Source: National Science Foundation

Dynamic thin film measurement data analysis method

The characteristics of how a moving thin film travels over a corner, interacting with the surrounding air, material edge surface and gravitational effects, are not well known. Challenges are encountered while attempting to measure transient fluid flow thickness at a point near the corner due to the small physical size and dynamic nature of the system. Images generated using an optical interference technique and high-speed photography are taken of the moving fluid. Due to the large quantity of images, a numerical analysis method using a discrete Fourier transform is used to filter valid signals in the images and calculate the film thickness at a point in time. The result is measurement of changes in the thickness of the moving fluid over some time period. The measurements are used to gain understanding of the dynamic fluid's behavior and instabilities in a corner separation system.

Nathaniel is a senior in Mechanical Engineering from Columbus, NE. He has worked as an undergraduate research assistant in the Combustion and Spray Dynamics laboratory in Mechanical Engineering for over two years. During his time working for Dr. Drallmeier, he has assisted in the research, purchasing, setup and operation of experiments pertaining to the graduate students that Drallmeier advises. He has been working with Mark Friedrich on thin film measurement data analysis since September of 2006. Nathaniel will graduate in May with a bachelor's degree in mechanical engineering.