FINAL TECHNICAL REPORT:
Request for support of the 11th Workshop on the Physics of Dusty Plasmas
Williamsburg, VA, June 28 – July 1, 2006

Project: DE-FG02-06ER54872

Principal Investigator: Dr. Edward Thomas, Jr.
(Present address) 206 Allison Laboratory
Physics Department
Auburn University
Auburn, AL 36849-5311
etjr@physics.auburn.edu
(phone) 334-844-4126
(fax) 334-844-4613

Project duration: 5/1/2006 – 5/31/2008

ABSTRACT:

This grant supported the publication of student papers that were presented at the 11th Workshop on the Physics of Dusty Plasmas. Papers were published in a Special Issue of the IEEE Transactions on Plasma Science, Vol. 35, Issue 2 in April, 2007.

Project Report:

A plasma is a hot, ionized gas and is the most common state of matter (e.g., solid, liquid, gas) in the universe. A dusty plasma arises when this plasma state has positively or negatively charged microparticles suspended within it. The field of dusty plasmas, which started as an outgrowth of the astrophysics community, has matured into a topic of industrial, environmental, and scientific importance.

The field of dusty plasma research is a rapidly growing scientific discipline within the plasma sciences. Laboratory investigations of dusty plasma have led to the identification of modified plasma behavior (e.g., dust-modified ion acoustic and ion cyclotron instabilities) and new dust driven modes (e.g., dust acoustic waves). Dusty plasmas have also led to the discovery of new strongly coupled plasma phenomena – so-called plasma crystals. In industrial plasma, where the dust is created as a byproduct of plasma processing, the presence of these suspended microparticles is a major source of contamination.

In June, 2006, the Eleventh Workshop on the Physics of Dusty Plasmas was held in Williamsburg, VA. As part of this workshop series, a Special Issue of the IEEE Transactions on Plasma Science has been published (as was done for the 9th and 10th workshops) that highlight results presented at the workshop. For this workshop, the Special Issue of the IEEE Transactions on Plasma Science was published in April, 2007 in Vol. 35, Issue 2.

Funds from the Department of Energy were used to pay in full or in part for student papers. Supported papers included:

Matthias Wolter, et. al., "Laser manipulation of the void edge in dusty plasmas under microgravity", IEEE Trans. Plasma Sci., **35**, 266 (2007).

Victor Land, "Manipulating dust charge using ultraviolet light in a complex plasma", IEEE Trans. Plasma Sci., **35**, 280 (2007).

Jeremiah Williams, et al., "Measurement of the kinetic dust temperature of a weakly coupled dusty plasma", IEEE Trans. Plasma Sci., **35**, 303 (2007).

Zachary Aldewereld, et al., "Observation of one-dimensional flows in a dc glow discharge dusty plasma", IEEE Trans. Plasma Sci., **35**, 309 (2007).