

**MECHANICAL ENGINEERING DEPARTMENT
ME/ISyE 8773-8774**

Modeling of a Plasma Discharge in an Ion Engine

by

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Wednesday, October 24, 2007
3:15 p.m. — Refreshments before the seminar
3:30 p.m. — Graduate Seminar
Room 1130 ME

ABSTRACT — Ion engines are being increasingly considered as a choice for space propulsion after their successful demonstration in the Deep Space 1 mission. NASA has been actively pursuing the development of the next generation of ion engines that are capable of meeting the increased performance demands of future missions in space. Design of the next generation ion engines can benefit from detailed computer simulations of the plasma in the discharge chamber. Computational models can aid in understanding of the plasma processes inside the discharge chamber, and also be useful for performing detailed parametric studies for design purposes.

In this work a complete particle based approach (PIC-MCC) has been taken to model the ion engine discharge chamber plasma. This is the first time that simplifying continuum based assumptions on the particle motion have not been made in an ion engine discharge chamber model. Because of the long mean free paths of the particles in the discharge chamber continuum models are questionable. In this talk the model and a number of results will be presented. The primary results are those for NASA's NSTAR ion engine at its full operating power.

BIO — **James A. Menart** graduated from the University of Minnesota with a Ph. D. in Mechanical Engineering in 1996. He worked under the guidance of Dr. Emil Pfender and Dr. Joachim Heberlein. Since graduation Dr. Menart has been a faculty member in the Department of Mechanical Engineering at Wright State University. Dr. Menart's work is primarily in the area of plasma science, but he has done work with radiative heat transfer and computational fluid dynamics. At the present time Dr. Menart's plasma work is focused on ion engines and altering high speed flows with plasmas. Dr. Menart is also very interested in engineering education and has received a number of student determined awards at Wright State University for outstanding teaching. Dr. Menart has over 70 technical publications and is a member of AIAA, ASME, and ASEE.

Informal Faculty Luncheon: Wednesday, October 24, 2007, 12:00 noon. Meet in 1100 ME and walk to lunch with other faculty. Prof. James Menart will be able to attend.