



Mechanical and Aeronautical Engineering Department
University of California Davis
Davis, California 95616-5294

2002 Monthly Seminar Series on Space Research

3rd Thursday 4:10-5:00 p.m., refreshments will be provided at 4:00 p.m.

SELECTION OF SPACE-PROPULSION SYSTEMS USING A DUAL-OPTIMUM PRINCIPLE

OSCAR BIBLARZ

Professor of Aeronautics and Astronautics
Naval Postgraduate School, Monterey, CA

Date: Thursday- February 21, 2002 Time: 4:00-5:00 pm Location: 1065 Engineering II

ABSTRACT

As electric propulsion becomes more competitive in space applications, there are many more thrusters to choose from. For the purely chemical systems, the index of performance has been almost exclusively a higher specific impulse. Now, with a number of electro-thermal, electrostatic and electromagnetic devices to choose from, the existence of a theoretical optimum specific impulse for every mission becomes quite significant. With a simplified analysis first proposed in the 1950's we can readily define such an optimum specific impulse. One difficulty with that analysis is that the problem remains unconstrained in that both payload mass fraction and burn time are initially undefined (even when the payload itself is specified and there is an upper limit on operating time). Thus the selection of a thruster remains far from unique. It is possible to constrain the problem by seeking the shortest burn time jointly with the appropriate highest value of the payload mass fraction. Such a dual-optimum criterion yields interesting results, which will be explored in the talk. The possibility of working with a dual-optimum may reduce some of the iterative nature of the design process.

ABOUT THE SPEAKER

Professor Oscar Biblarz joined the Naval Postgraduate School after obtaining his PhD in Mechanical Engineering from Stanford University. His academic interests have been in high-temperature gas dynamics, in space propulsion and in laser aerodynamics. He also has had industrial experience at Hughes and GTE, having been involved with space propulsion and power since his baccalaureate days. He earned both the BS and MS degrees in Engineering from UCLA. He is co-author of the VIIth edition of *Rocket Propulsion Elements* with George Sutton.

**For more information about SpaceED program or the seminars please contact
Professor Nesrin Sarigul-Klijn at (530)-752-0682 or nsarigulklijn@ucdavis.edu**

Members of the campus community and visitors from the region are welcome to attend the seminar series. Sign-in is required at the event. SpaceED seminar will replace MAE297 seminar on 3rd Thursdays.