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Networking 3:30-4:00 PM; Presentation 4:00-5:00 PM

Spacecraft Charging and the International Space Station

Professor Charles Swenson

Department of Electrical and Computer Engineering, Utah State University

The International Space Station (ISS) is truly unique. Never before has mankind operated such a largely distributed, high-voltage direct-current power system in space. There were no established standards or historical bases to guide the development of this 76.4 kW system. The interactions of the power system with the conductive ionosphere through which the ISS travels complicates matters. The power system helps drive the electrostatic charging of the ISS. Excessive vehicle charging has been identified as a risk to astronauts working outside of the station as well as accelerating the degradation of the space station surfaces. Because of the potential seriousness of these risks a set of instruments called the Floating Potential Measurement Unit (FPMU) has been developed to monitor charging on the ISS and the conditions in space that lead to it. These measurements will be used to provide a safer environment for the astronauts during Extra Vehicular Activities or EVAs. The FPMU program was a fast response effort by the Utah State University Space Dynamics Laboratory to meet NASA concerns of potential extreme charging events combined with the failure of systems that were designed to control them. The FPMU will be used to correct the charging models of the ISS each time a new section or part is added to the structure. The FPMU was ready for launch on the flight following the Columbia Accident. It will be installed on the ISS once the space shuttle fleet returns to flight in the first half of 2005.

About the speaker: Dr. Charles Swenson is an Associate Professor in the Electrical and Computer Engineering Department at Utah State University. He is the Co Director of the Utah Space Research Institute and a Senior Scientist at the Utah State University Research Foundation Space Dynamics Laboratory. He teaches graduate level courses in the area of space engineering and instrumentation for space science. He considers himself an experimentalist fitting somewhere between the engineer and physicist. He has been heard to complain that no one takes him seriously. When he talks to physicists they dismiss him as being just an Engineer and when he talks to Engineers they dismiss him as being just a physicist. His research activities are often in association with the Utah State University Space Dynamics Lab and span the areas of space science, instrumentation for measuring the space environment, and small satellite systems engineering.