Rocketry/Aerospace

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This session focuses on the aerospace technology, especially the future of space transportation systems. Rocketry is the foundation of space development, and space transportation systems are highly developed in some countries. A successful launch to achieve orbital or suborbital flight is a complex and often expensive endeavor, as recent commercial attempts have shown. Rockets involve many coupled systems to ensure they achieve their desired velocity and flight path. Of main interest here is the propulsion element of the system. Within a rocket, propellant is burned to produce high pressures and, ultimately, thrust. The combustion process within the rocket chamber must be understood and controlled even as the outside environment changes from atmospheric pressure to conditions at or near that of outer space (very low pressure). Highly turbulent flow in the chamber as well as possible changes in chamber geometry complicate the understanding of the combustion process.

Space programs throughout the world are about half a century old, but they show strong signs of change, particularly in the areas of increased reliability and cost suppression. The trend towards increased private sector involvement also drives the desire for better reliability and lower cost solutions. In Japan, the development of H-IIA has been completed with 12 flights to date; consequently, the management of this vehicle has been transferred to the private sector. Since the final launch of the M-V in 2006 JAXA has started to develop a new solid rocket system based on the technology of the M-V. In the U.S., many commercial companies are attempting to make space tourism a reality. NASA is developing new rockets for trips to the moon and beyond, and, with the retirement of the Titan class of launch vehicles, the government is moving away from hydrazine-powered rockets to other propulsion technologies.

Experimental work remains an important component of advancing rocket technology. With the increase in computer technology, Computation Fluid Dynamics (CFD) is becoming ever more sophisticated and more prevalent. This session will discuss the present and future technology of rocket systems. The areas of experimental and computational investigations will be explored. On-going technical and nontechnical difficulties will also be explored from the perspective of commercial space flight.