

Planned Draft AGARD Paper
NSTAR In-Space Electric Propulsion Experiments

Abstract

Ion propulsion provides an order of magnitude improvement, relative to chemical on-board propulsion systems, of specific impulse, at the cost of a relatively small increase in propulsion system dry mass. For civilian spacecraft, ion propulsion technology provides the potential for increased performance and reduced cost for planetary spacecraft and for large satellites in geostationary orbit. For military applications ion propulsion offers significant benefits for station keeping and repositioning satellites in geostationary orbit. NASA has begun to validate ion propulsion technology for applications to which 2.5 kW to 5.0 kW ion thrusters would be appropriate. NASA's validation program, called NSTAR (NASA SEP Technology Application Readiness), consists of two major elements: a ground test element and an in-space, experiment. The Ground Test Element will validate the life, integrability, and performance of low-power ion propulsion. The in-Space Element will demonstrate the ability to integrate and fly an ion propulsion system. As an experiment, it will measure the interactions between the ion propulsion system, the host spacecraft, and the surrounding space plasma; and it will provide a quantitative assessment of the ability of ground testing to replicate the in-space performance of ion thrusters. By involving industry in this program, a commercial source for this technology will be assured. Further, the successful completion of the NSTAR validation program will stimulate commercial and government (both civilian and military) uses of this technology.