Capitol Graduate Research Summit

Methods for the Optimizing Trajectories of All-Electric Satellites for Multiple Variables and Launch Conditions

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With the current shift from chemical to all electric thrusters and satellites that is currently being undertaken in the space industry, the state of Kansas is set in a prime position to benefit greatly as new technologies and designs are experimented with and implemented. New designs for spacecraft also mean new jobs for manufacturers of components of all-electric spacecraft and associated launch vehicles as satellites become smaller, lighter and less expensive. The expertise in aerospace manufacturing that already exists can be utilized to attract both new companies and facilitate any expansion that might occur in order to address servicing the needs of all-electric spacecraft. As part of the research being conducted, the implementation of a transfer path from a starting orbit to Geosynchronous Earth Orbit (GEO) is being analyzed and optimized for a number of factors: minimum transfer time, minimum fuel expenditure, and minimum radiation damage. It is important to consider all of these aspects because of the degree to which they are interconnected. The longer a space craft in in transit, the more it is exposed to damaging radiation which in turn limits the amount of power available to thrust, meaning longer transfer times, etc. Each of these factors contribute in different ways to creating an optimum design to make sure that the spacecraft are able to perform comparably, if not exceed, the current designs resulting in possibly saving millions of dollars in launch and operation costs.