Paper ID: 89414
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22nd IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)
Strategies for Rapid Implementation of Interstellar Missions: Precursors and Beyond (4)

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ADVANCED CAPABILITIES FOR NUCLEAR ELECTRIC POWERPLANTS FOR INTERSTELLAR PRECURSORS

Abstract

In recent years there has been a number of advances in fields tangential to, but including nuclear reactors that gives promise to space nuclear electric power systems whose specific mass, =kg/kWe achieving values ¡20 kg/kWe. Historically, the concept was to have very high temperature reactors, Toutlet¿ 1300 Kelvins driving relatively inefficient thermoelectric system with high temperature radiators. The concept was that since radiators comprised a relatively large fraction of the systems mass, the radiators should be made as small as possible. The advent of composite materials has ushered in the potential for large, lightweight radiators, which can enable highly efficient systems, generating moderate quantities of electrical power, with low values of power system .

Little Prairie Services, LLC has pioneered work in several areas leading to an integrated system with a power system ¡20 kg/kWe at electrical power levels 375 kWe. The power systems themselves are presently design to operate for 5 full power years, however, we discovered that given the correct conditions, velocity additions ¿ 100 km/s were feasible with approximately 1 -2 full power years of thrusting, followed by 20 years operations at 10

In this paper the author discusses the advances made by LPS in concert with research from other organizations to improve efficiency, power levels, and to minimize system mass with a few examples of potential implications of these advances. The technologies are all quite advanced in development status, but have not been integrated in this fashion before.