

IAF SPACE PROPULSION SYMPOSIUM (C4)
Joint Session on Advanced and Nuclear Power and Propulsion Systems (10-C3.5)

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DESIGN AND DEVELOPMENT OF NUCLEAR REACTOR POWERED ELECTRIC ION
PROPULSION SYSTEM

Abstract

Space exploration has emerged as a critical need for human race and there are many legitimate reasons for that, some of them are increasing population, depleting of earth resources, rapid change in climatic conditions, depleting forests (recent example can be of amazon rainforest which is the lungs of planet Earth and now it's burning like a hellfire), melting glaciers and many more which arises the need for space exploration. The present methods used for this purpose has their own limitations and some of them are travelling time and efficiency. The conventional methods used for the space exploration includes the use of chemical propulsion and electric ion propulsion for small satellites which are not enough for human transportation to deep space in a small amount of time. And the plans for establishing human settlements on Mars and Moon also gives a tremendous boost to the need for a faster mode of transportation as it will cater in managing the emergency supplies and in a critical situation. The one of many pragmatic solution for this include the use of a powerful and a long endurance propulsion system which can take us to Mars, Moon and even beyond really fast. The nuclear powered ion propulsion system is kind of a system which can foster our needs. In this system nuclear reactor having small dimension will be used to produce the ample amount of electricity which will be required to power the ion propulsion system in which the atoms of the propellant used will divided into equal number of protons and neutrons (fourth state of matter, plasma) at a very high temperature thus generating a very high specific impulse like never before. In this paper we are proposing a complete design and analysis of the nuclear ion propulsion system further exploring the horizon for use of iodine as a fuel. And along with this a comparison will be done on the basis of various parameters like specific impulse, storage, weight, operation time and feasibility of iodine with respect to other conventional fuels.