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NUCLEAR REACTOR DESIGN FOR A SELF-SUSTAINING LUNAR ESTABLISHMENT OF 100
OCCUPANTS FOR 5 YEARS

Abstract

Currently several space oriented industries, research centers and individual researchers are working on a road-map to colonize the extra-terrestrial bodies like Moon and Mars. In all the studies a suitable source of power is profoundly searched. As per majority of the recent proposed plans to colonize the Moon or Mars the initial time frame of self-sustaining habitat ranges from 1-5 years. Energy requirements for this time frame can efficiently be fulfilled through Nuclear Energy. The conditions on extra-terrestrial bodies can vary drastically as compared to Earth including different material/substance behaviors and because of this a reactor which operates efficiently on Earth may not operate efficiently on Moon therefore extensive study of different types of Nuclear fuel, suitable moderators, efficient coolant and structural designs is needed so that a reactor can be proposed which can operate efficiently in the discussed drastic conditions within established safety parameters. This paper primarily aims to analyse and compare different types of Nuclear reactors along with selection of suitable moderator and a proposal of design in accordance to the physical conditions of Moon. The secondary objective of this paper is to discuss the preference of nuclear energy over any other source of energy for an establishment over the discussed time frame.