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THORIUM BASED NUCLEAR ENERGY GENERATION TO POWER MARTIAN SETTLEMENTS

Abstract

Technology to harvest energy efficiently from a nuclear source plays a significant role towards advancement in interplanetary travel. From rocket fuel to energizing colonies on different planets, energy requirement is huge with constraints of space, weight and long duration. As the humankind start expanding their permanent presence to outer space, in particularly towards Mars, asteroids and moons of outer planets such as Jupiter and Saturn, large quantities of energy will be necessary for sustenance. With increase in the distance from the sun, the solar irradiance decreases significantly. As an estimate, solar irradiance on Mars orbit is 45% of that on Earth. Uranium, which powers most of today's nuclear power plants is available in very small quantities and not readily usable. Contrarily Thorium, another radioactive element, unlike Uranium is available in abundance here on earth, can be found on Mars as well and could be used there to generate large quantities of electricity. Due to multitude of core processes to harvest nuclear energy and keeping in mind different physical conditions of the Mars, specific designs have to be implemented to efficiently harvest the energy. Thus, this paper focuses on addressing how Thorium based reactors are an efficient energy source for the establishment of Martian colonies.