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USAGE OF NUCLEAR POWER AS AN ENERGY SOURCE FOR SPACE STATIONS AND SPACE HABITATS

Abstract

With the advent of the space age, the process of creating HEO space stations, gateway stations, as well as solar system outposts on various planets has become a real possibility in the near future. The biggest challenge is to supply enough energy for these bases and constructs, since classic energy sources are usually unfeasible for long-term missions. In space, it is essential to have extensive support to create power for the various requirements such as life support, communications, waste removal, etc. Thus, functional power sources are needed that can function in long-term. Due to its basic properties, chemical or thermal means of generating electricity would be quite difficult and unproductive under microgravity and vacuum conditions. Moreover, it would create several control and stability issues as well. However, with the availability of a 4th or 5th generation nuclear reactors, all of the power requirements in a space based station or a space habitat or a planetary outpost can be met for several years without any difficulty. Nuclear reactor power systems can support human exploration at surface outposts and space stations. A nuclear reactor on the surface of the Moon or Mars can be a source of reliable power to provide life support, and to supply the large power demands of facilities processing materials. On an outpost it can provide power for production as well. This paper discusses development of new nuclear systems feasible for space stations, outposts and habitats since these can be stepping stones to the stars in the future.