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CONCEPT STUDY OF A NUCLEAR WATER ELECTROLYSIS POWER AND PROPULSION
SYSTEM

Abstract

The system framework of a nuclear water electrolysis power and propulsion system(NWEPPS) for space vehicles is proposed in this paper. The water electrolysis subsystem of the NWEPPS uses the electricity power from the nuclear thermoelectric conversion to electrolyze the water. Hydrogen and oxygen are produced and stored after liquefaction by the refrigeration system. Then the liquid hydrogen and oxygen can be used as propellants in the engine of the power system, provide propulsion for space vehicle. The NWEPPS proposed in this paper will realize comprehensive cross utilization of the gas, liquid, electricity, heat and other material flow and energy flow of the space vehicle. Comparing to the custom propulsion system, the NWEPPS has the advantages of multifunctional power supplement, high specific impulse and high power ratio of the propulsion, no pollution and good compatibility with space vehicle life sustain system. So, it is promising in the future space applications. The feasibility of the NWEPPS's key subsystems, such as the nuclear reactor, the water electrolysis subsystem, the refrigeration subsystem, is studied in this paper, and the space performance of the NWEPPS is also studied.