Paper ID: 29344
student

SPACE POWER SYMPOSIUM (C3)
Wireless Power Transmission Technologies, Experiments and Demonstrations (2)

Author: Mr. Erinn van Wynsberghe
University of Michigan, United States

Dr. J.P. Sheehan
University of Michigan, United States

STATION-KEEPING OF A HIGH ALTITUDE BALLOON WITH ELECTRIC PROPULSION AND WIRELESS POWER TRANSMISSION: A CONCEPT STUDY

Abstract

The feasibility of maintaining stable geographic position of a high-altitude balloon is investigated. High-altitude winds are overcome by electric propulsion to maintain position or to guide the craft to a desired location. The craft rises to the atmospheric height limit for balloons (about 40 km) where air is sufficiently thin to enable operation of electric thrusters. Instead of a large compliment of batteries, electric power to operate the thrusters is provided by a ground-based microwave transmitter (magnetron, klystron, etc.) which sends energy wirelessly at either 2.45 or 5.8 GHz to a thin rectifying antenna (rectenna) on the bottom of the craft. Energy requirements, safety, and mission architecture for a prototype system are presented, as developed from numerous studies and demonstrator models.