

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Interactive Presentations - IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS
SYMPOSIUM (IP)

Author: Dr. Sergiy Matviyenko
JSC "RPC "KURS", Ukraine, matvienko_2005@ukr.net

SPACE "FILLING STATION

Abstract

Space "filling station". JSC "RPC "Kurs" for the last 30 years has been developing and manufacturing automatic systems for convergence and docking of the "Igla" and the "Course". The successful operation of these systems is a pledge for the implementation of the concept of "Double Launch", which consists in the separation of the spacecraft into a reference orbit and the interorbital tug with their subsequent docking and launching of the spacecraft into a working orbit. This withdrawal technology is protected by the Ukrainian patent No. 89490, which in 2011 was recognized by the results of the "Ukrainian competition - 2011" the best invention of the country in absolute nomination. However, along with such an obvious advantage of such a scheme of launching into orbit as a reduction in the cost of excavation due to the use of cheaper carrier rockets, there is also a serious drawback, which consists in the one-time use of an interorbital tug. The solution to this problem is to use a block of plasma engines and a power system based on fuel cells in the interorbital tug, which has a power of about 100 kW. Electric energy is generated as a result of the interaction of oxygen and hydrogen on the fuel cells, followed by the formation of water. The advantage of such a power supply system is the low weight of the fuel cell assembly, the high efficiency of fuel cells (at least 60%). The solution to this problem is the expansion of the functionality of solar power plants, which should be based on the geostationary orbit, and the organization of "space filling stations" on their basis. The principle of "space filling stations" is that the interorbital tug after putting into the working orbit of the spacecraft docked to a solar power plant and "refueled" with liquid oxygen and hydrogen, giving in return water. At the solar power plant there is electrolysis of water and liquefaction of formed hydrogen and oxygen. After this, the process of "refueling" an interorbital tug may be repeated many times.