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Space Resources, the Enabler of the Earth-Moon Econosphere (5)

Author: Mr. Chengyu Jiang  
Shanghai Jiaotong University, China, ch.jay@i-eds.org

Dr. Quanzhi Ye  
Caltech/IPAC, United States, qye@caltech.edu

THE EDS, A BOOTSTRAP LARGE SCALE INDUSTRY IN DEEP SPACE, TOWARDS  
EARTH-MOON ECONOSPHERE

**Abstract**

Structure mass of space system is a critical limitation when launched into orbit and takes a significant part in large equipment. The further investigation includes on-orbit assembly, in-situ resource utilization of fuels, building materials, etc. However, exponential expansion of the industry is needed to get sustainable growth space industries. We propose the concept of Exponential Deep Space (EDS) here to enable exponential scaling of industry in deep space to achieve the goal above. A systematic method of utilizing solar energy for smelting iron meteorite and shaping in metallic Near Earth Asteroid (NEA) is proposed in this paper. Solar collector enables in-situ melting and forming for structural materials. After that, we utilize a space robot arm system to replicate the solar collector and other key structures including the robot arms itself to enable exponential growth of deep space industries. A reasonable payload has been planned to meet the requirement of the launch system for the initial base package. The key challenge has been analyzed including positioning/attitude of the solar collector, metallurgy problem under micro-gravity/vacuum environment, and the failure rate influences of the autonomous system. Series of evidence of the existence of metallic NEA have been proposed, including the requirement of the properties of the target NEA. Several potential applications as in Earth-Moon Econosphere have been evaluated in the 5th section of the paper. Finally, we estimated the sustainable throughput with rational supplements from the earth industry and further potential developments have been discussed.