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Author: Mr. Rishin Aggarwal

Space Generation Advisory Council (SGAC), India, rishin.chd@gmail.com

Mr. Arjun Vijaykumar

Space Generation Advisory Council (SGAC), India, mfd19i011@iiitdm.ac.in

Ms. Dhanisha Sateesh

Space Generation Advisory Council (SGAC), India, dha.tulip@gmail.com

Mr. RAJ PANCHAL

Space Generation Advisory Council (SGAC), India, raj.mpstme7@gmail.com

Mr. Mehdi Lali

Purdue University, United States, mlali@purdue.edu

Ms. Rania Toukebri

DSI Aerospace Technologie GmbH, Germany, rania.toukebri@spacegeneration.org

Ms. Smiriti Srivastava

Space Generation Advisory Council (SGAC), India, smiriti.srivastava@spacegeneration.org

DESIGN AND ANALYSIS OF SPACE TRANSPORTATION SYSTEMS FOR ASTEROID RESOURCE
UTILIZATION : A BASE FOR DEVELOPMENT OF FUTURE MARS HABITATS

Abstract

Asteroid mining for resources has been long discussed and various technologies for the same are being developed. Raw materials from the asteroids can be used for achieving the long term goal of colonizing planets like Mars. This paper focuses on designing an efficient transportation system for carrying the raw materials from selected viable asteroids to the surface of Mars where it can be utilized for colonization and building of space habitats. Several resource transportation structures like robotic crafts, tethers, landers, etc. are analyzed based on their fuel requirements, mass, efficiency, performance, cost and engineering aspects. Selection of the most optimal system is undertaken. The propulsion systems for the transport structures are also evaluated on similar parameters. This paper undertakes a comprehensive analysis of various design alternatives for the transportation of resources from asteroids to select the most suitable system that would, one day, lead to the development of a fully functional Mars colony.