23rd SYMPOSIUM ON SPACE ACTIVITY AND SOCIETY (E5)
Human Habitation Beyond Low Earth Orbit (3)

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FAXING STRUCTURES TO THE MOON: FREEFORM ADDITIVE CONSTRUCTION SYSTEM (FACS)

Abstract

Using the highly articulated All-Terrain Hex-Limbed Extra-Terrestrial Explorer (ATHLETE) robotic mobility system as a precision positioning tool, a variety of print head technologies can be used to 3D print large-scale in-situ structures on planetary surfaces such as the moon or Mars. In effect, in the same way CAD models can be printed in a 3D printer, large-scale structures such as walls, vaults, domes, berms, paving, trench walls, and other in-situ derived elements can be FAXed to the planetary surface and built in advance of the arrival of crews, supplementing equipment and materials brought from earth. This paper discusses the ATHLETE system as a mobility / positioning platform, and presents several options for large-scale additive print head technologies, including tunable microwave "sinterator" approaches and in-situ concrete deposition. The paper also discusses potential applications, such as sintered-in-place habitat shells, radiation shielding, road paving, modular bricks, and prefabricated construction components.