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LUNAR HABITAT CONSTRUCTION – A COMPOSITE ENCLOSURE SYSTEM

Abstract

This paper proposes a method of lunar habitat construction that combines two existing habitat concepts. The first is a sandbag construction concept that was first proposed for construction on the moon by Nader Khalili in 1984. The second is the double skin inflatable habitat concept.

The lunar habitat's construction would be preceded by a host of robotic vehicles designed to accomplish two tasks. First, robotic dozers would clear and level the designated site for the habitat. Second, a robotic sandbagger would create and stockpile sandbags by filling specialized lightweight plastic bags, brought from Earth, with lunar regolith.

A crew of astronauts would be necessary to carry out construction of the lunar habitat. This would begin with the inflation of a double-skin cupola. Once inflated, the air space of the double-skin cupola would be foamed, using high-expansion foam. This transforms the cupola from an inflated structure to a rigid, foamed structure. The foamed cupola's purpose is to contain a livable atmosphere for its inhabitants. A second, and structurally independent, sandbag cupola would then be constructed to enclose the foamed cupola. The purpose of the sandbag cupola would be to create a barrier of lunar regolith around the foamed cupola, thereby protecting it from micro-meteorites, radiation, and extreme temperatures. The proposed lunar habitat construction method utilizes in-situ resources for the bulk mass and volume of required construction materials, and therefore creates significant reductions in the size and weight of construction materials that would require delivery from Earth.