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QUICK SETUP MECHANISM FOR LUNAR BASE CAMP ON THE POLE / IN THE PIT

Abstract

At the beginning of lunar habitation, a quickly deployable base camp is beneficial in preparing for permanent human presence. The lunar pole is assumed to be the target site due to its sunny spot, which is suitable for the photovoltaic system, while the lava tube in the pit is considered a favorable site due to its protected environment. The habitation module and related infrastructure equipped with simultaneous and semi-passive deployment mechanisms for its primary structures are applicable on either site. Once the pillow-shaped envelope of the habitation module inflates owing to the internal air pressure, the embedded floor expands inside the envelope, while adjustable legs are ejected and touchdown on bumpy terrain. The multi-faceted pillow shape is made of aluminum plate for which Sakura dimples and curved crease enable snap-through easily. For the pole, an inner inflatable skin, on each side of which radiation shield panels and insulation panels are attached, is crumpled inside the aluminum envelope during transportation and deploys simultaneously with the aluminum envelope. The solar power module has fanning panels that deploy in reference to the hind wing of an earwig. A petit crater around the landing spot is suitable for the pilot test of the water survey. A cable lift suspended from an overhang connects the permanent shadow in the petit crater and the rim, while it connects the bottom of the lava tube and the ground surface. To reduce the number of transports, an all-in-one module involving the habitation envelope, the solar panel, and the overhang is helpful as an option. The pilot exploration involving the deployment test against lunar dust, the touchdown test onto the bumpy terrain, and the component extrusion test from the landed spot to the target spot for the crater or the pit are compatible. Consequently, the human presence spread concurrently on the pole / in the pit.