PROJECT SUMMARY

Influence of Pre-Sintering and Post-Sintering Compaction on Lunar Soil Stabilization: An Exploratory Study

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ABSTRACT

The new Vision for Space Exploration stimulated re-generated interests on the exploration, colonization, and civilization on the Moon, which require lunar soil stabilization. The need for lunar regolith stabilization has long been recognized before the dawn of the space age. Due to the NASA's mission and interests in in-situ resource utilization (ISRU), sintering and compaction are more preferred over other soil stabilization technologies which need launching materials from the Earth. However, previous efforts have focused the separate influence of either compaction or sintering on lunar soil stabilization, and the coupling and interplay of these two ISRU techniques have not be studied.

The project proposes an exploratory study to investigate the influence of pre-sintering and post-sintering compaction on lunar soil stabilization and the coupled influence of sintering and compaction on the mechanical properties of lunar soil. In addition, the currently available lunar simulant lacks one important property that makes difficult to be sintered using microwave radiation: the absence of nanophase Fe$^0$ on simulant particle surfaces. The project will also improve the simulant by adding nanophase Fe$^0$ to the simulant. Finally, proactive collaboration with the NASA sponsor will be pursued by planned visits, discussion and dissemination of research results.