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Type: **Poster (+) Presentation**

CT histogram-based estimation of sub-resolution porosity of sintered lunar regolith simulant

Wednesday, 2 June 2021 09:00 (1 hour)

Abstract

Moon base in the not-too-distant future has been brought to the table and the abundant lunar regolith can be used for construction materials. Due to lack of water in the moon, sintering methods (e.g., solar, vacuum and microwave), are considered to manufacture lunar regolith blocks with expected strength. Microwave sintering experiments has been conducted in our laboratory using the lunar regolith simulant under different test conditions, such as temperature and soaking time. Strength of the sintered sample is significantly influenced by the porosity and microstructure homogeneity. CT scans show that the sintered lunar regolith simulant samples are mainly composed of solid (minerals), pores and a few microcracks depending on sintering conditions. In addition, most pores have very small sizes that are sub-resolution (less than 60 micrometer in this study). Pore segmentation using the threshold-based approach ran into difficulties. Therefore we employed a novel method, called statistical phase fraction (SPF) based on CT value histograms, to estimate the sub-resolution porosity. The estimated porosities of several different samples show a good agreement with measurements through helium gas pycnometer. The key parameters for the SPF method include CT values of air and pure solid, and fitting Gaussian functions to CT histograms. Parameter estimation and sensitivity analysis for the SPF method are discussed.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

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Primary author: ZHUANG, Li (KICT)

Co-authors: Mr PHAM, Chuyen Ngoc (University of Science and Technology); Mr YEOM, Sun (Korea Institute of Civil Engineering and Building Technology); Dr KIM, Young-Jae (Korea Institute of Civil Engineering and Building Technology); Dr SHIN, Hyu-Soung (Korea Institute of Civil Engineering and Building Technology)

Presenter: ZHUANG, Li (KICT)

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