High pressure impact on geomaterials –grain crushing and structural evolution-

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High pressure impact problem on geomaterials has been of great concern in various fields such as earth and planetary science, energy engineering, and civil engineering. Geomaterials are composed of geological grains and accordingly their bulk mechanical behavior is affected by their grain-scale behavior. In particular, high pressure impact loading results in considerable grain crushing and subsequent grain rearrangement, which leads to plastic compression as well as drastic change in their bulk mechanical properties. The present study focuses on the following three aspects; (1) the relationship between the Hugoniot equation of motion and the classical e-log p (the void ratio – pressure) relation in soil mechanics [1], (2) a micromechanical model of plastic compression of granular materials due to grain crushing [2], and (3) a fractal grain size distribution observed in lunar soil and Itokawa regolith [3]. We discuss the relation among those aspects and try to draw a whole picture of high pressure impact problem on geomaterials.

References

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