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The influence of moisture content on the shock compression responses of brittle granular materials KUN XUE, Beijing Institute of Technology — The irreversible energy-absorbing compaction processes of shocked particle layers change with the moisture content. The shock wave interaction with dry and wet granular layers is experimentally investigated to elucidate the moisture effects on the energy distribution in the brittle granular layers. It is found that the frictional and breakage dissipation combined as the plastic dissipation in the granular layers is increasingly mitigated by the increasing moisture content. The higher strain rate in the shock loaded wet granular layer leads to an increased number of debris as predicted by the theoretical analysis. Nevertheless the inter-particle moisture effectively lubricates the enhanced particle friction arising from the intensive particle rearrangement concomitant with the greater degree of particle breakage. As a result, the efficiency of the momentum transfer in the wet granular layer is significantly improved manifested by the much larger particle kinetic energy. Meanwhile the particle breakage mode transits from the corner grinding to the shear cleavage with moisture content as revealed by the SEM image of the recovered grains from shock wave experiments.

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