

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Porosity of mixed granular media of hard and soft grains EMILIE VERNEUIL, DOUGLAS J. DURIAN, University of Pennsylvania — The addition of soft particles to granular materials modifies the packing properties such as the volume fraction and the interconnection of pores as a consequence of the particles squishiness. A macroscopic property that depends on the local arrangement of the grains is the hydraulic conductivity. Hence, hydrogel particles are developed as additives to sandy soils to improve the irrigation efficiency by decreasing the rate of far depth infiltration. However the parameters that control the mixed material porosity have not been explored. Our experimental study of the flow properties of mixtures of glass beads and swollen hydrogels aims at deriving simple arguments to connect the macro-scale measurement of the hydraulic conductivity to the arrangement of the grains around the soft particles, which determines the fraction of blocked pores. Our results show that the porosity decreases with the number of swollen gel per unit volume of the mixture. The conductivity also decreases as the size ratio of gel to glass bead decreases down to 1. A simple description accounting for the elastic contacts between glass beads and gel surface qualitatively accounts for the data.

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Date submitted: 11 Dec 2008

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