Methods of Quantifying Geometry at the Pore Scale in Soils. (S01-lebron155937-Poster)

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Abstract:

Pore-scale modeling is proving a lucrative area for developing improved conceptual understanding of the transport behavior of porous media. An important requirement of most of these models is a description of the geometry of the porous material. Traditionally 2-D thin sections have been used to examine the pore space in soils, however the demands of the pore-scale approach require 3-D quantification of geometry. This work describes a number of promising methods of obtaining 3-D geometrical information that can provide geometry coefficients that can be inserted into transport models. One method uses SEM imaging in 2-D slices, which are quantified through image analysis to give tortuosity and connectivity. An alternative method used in the present work relates the shape of granular particles to the angle of repose of a slope of poured material. The less spherical the material the greater the angle formed by the slope. These methods provide cheaper and more accessible methods of quantifying granular media than say 3-D X-ray tomography. However, they provide alternative ways of characterizing geometry. The geometry factor obtained with this methodology can be used to evaluate the effect of pore geometry on saturated hydraulic conductivity and particle shape on bulk electrical conductivity and permittivity. As the soil geometry is a major factor affecting transport properties in soils this research seaks to advance our ability to better quantify this important physical property.

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