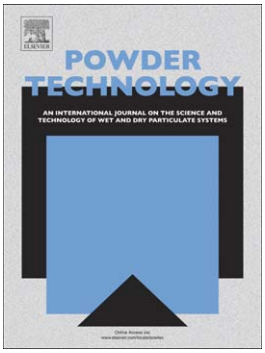


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# Effect of the particle size and the liquid content on the shear behaviour of wet granular material

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## Abstract

The size of particle is a relevant parameter in the study of the granular material behaviour. For wet granular materials, it affects the capillary force and the number of liquid bridges. We present quantitative and qualitative investigations of the effect of the particle size on the steady-state shear behaviour of partially wet granular material. Two sizes of glass beads have been used: 12-40 µm and 70-110 µm in diameter and the shear behaviour was studied using an annular shear cell. The results show different regimes of the shear-normal stresses relationship depending on the particle size, with a general increase of the magnitude of the shear stress for a decrease in the particle size.
Most studies of wet granular material behaviour have focused on the pendular state of saturation with liquid bridge formed between particles. In this study, the states of saturation are explored going up to completely filling the space between beads of 70-110 µm. Different regimes are identified depending on the liquid fraction and the applied normal stress. A theoretical approach was used to estimate the tensile strength for the different states of saturation. An agreement between both experimental and theoretical data was observed and discussed.

***Keywords***: Particle size, Liquid content, Capillary force, Tensile strength, Shear stress, Wet granular material