



The application of the x-ray microtomography to describe granular mixtures

R. Sosio, A. Villa , G.B. Crosta

Università degli Studi di Milano Bicocca, Dipartimento di Scienze Geologiche e Geotecnologie, Milano, Italy

rosanna.sosio@unimib.it

Fax: 02 64482092

Phone: 0264422080

The study of granular materials is of interest for many geological, hydrological and engineering fields. We use the X-Ray Microtomography (MCT) to describe quantitatively the composition (the constituents and their distribution in space and with time) of suspensions of granular materials.

The sample is constituted by a natural suspension of silt and clay immersed in water at a known solid concentration, where spherical particles of different materials, are introduced. The spheres are characterised by a fixed diameter of 0.300 mm and density higher than the matrix in which they are suspended.

The scanning is performed on a small volume of the whole material filling a cylindrical container (60 slides corresponding to a block of 2.05 mm in height) and is repeated in 6 subsequent steps, each lasting approximately 13'. The images express, as grey levels, the absorbance of each voxel which constitute the investigated volume. Within the applied energy window (80 KeV), the absorbance is primarily a measure of the density of the medium.

Despite the attempts to avoid the phenomena, the analyses reveal the presence of entrapped air within the sample, ranging from 62 μm (minimum detectable volume) to 1.8 mm in diameter. The comparison of the images taken at subsequent times allows

us to evaluate the direction and velocity of motion of the air bubbles and for the immersed spheres. The method proves to be reliable to detect the constituents of the sample, as soon as there is a density and dimensional contrast between the phases which constitute the whole material.