

Paper P10

## The effect of soil heterogeneities on the movement of DNAPL using small-scale geotechnical centrifuge

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A mini 0.6 m diameter beam centrifuge has been fabricated at the Universiti Kebangsaan Malaysia in Bangi, Selangor. The centrifuge took almost one year to build. The centrifuge was designed to allow centrifuge testing of soil package for up to 5 kg of weight with maximum rotational speed of 500 RPM and can accelerate for up to 140 in units of times gravity (xg). The dimension of soil package is 10 cm (width) x 28 cm (length) x 19.5 cm (height). This centrifuge is equipped with coloured digital video camera and high speed stroboscope. The recorded of moving images can be stored directly into the computer. Real time video images can also be observed on the LCD monitor installed in the operation room. The centrifuge is controlled using a control box with various buttons and digital displays such as on/off button, RPM controller with digital display. As a safety precaution, the body of the centrifuge is made using double layers 5mm steel with 5cm absorbing membrane as sound barrier. It has a vibration auto switch-off that will automatically stop if the vibration is exceeded the permissible vibration limit. The paper will highlight some early results of the test carried out in this new centrifuge. The test was carried out to investigate the effect of soil heterogeneities on the plume flow pattern of contaminant (DNAPL) in soil. The strong box was filled with different soils to simulate various soil heterogeneities such as horizontal and dipping bedding planes, lenses of clay, saturated-unsaturated zone, and different grain sizes. Tetrachloroethylene (PCE) dyed with Sudan V was introduced as a contaminant on top of the strong box. The test was carried out at different G force, i.e. 20, 40 and 60 g. The behaviour of DNAPL movements in geotechnical centrifuge will be compared with 1-g experiment conducted in a small mini tank in the laboratory.