

UNIVERSITI TEKNOLOGI MARA

**THE EFFECT OF PARTICLE BREAKAGE
ON THE STRESS-STRAIN CURVE**

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ABSTRACT

Granular soils can be found in natural slope, foundation base and embankments. It is subjected to static and dynamics loads and the loads can cause particle breakage. Particle breakage is a phenomenon where the soil particles transform to finer state due to slippage, dilation and creep. Particle breakage can affect the stress-strain curve and this is the main focus in this study. The behaviour of stress-strain curve is no more typical if particle breakage commence. The results of consolidation isotropically drained triaxial test of coarse grain sands are presented in this study. The aim of this research is to study on how particle breakage affects the stress-strain curve. The specimens are made of quartz sand with grain size 0.6mm, 1.18mm and 2mm. There are 15 specimens presented with confining pressures 50kPa, 100kPa, 200kPa, 300kPa and 400kPa are applied for each grain size. The breakage is detected using microphone and the sound recorded is analysed via Sony Sound Forge software. Moreover, dry sieve analysis is conducted before and after the test in order to justify whether breakage occur during shearing stage. From the results obtained, it can be seen that particle breakage has shifted the axial strain at failure. The peak strength at failure always coincide at the same axial strain but particle breakage cause the peak strength to shift to the right with increasing confining pressure. The effect on the Mohr circle shows that particle breakage causes the failure envelope to be curved at high pressure. Normally the test with no particle breakage results a straight failure envelope. The effect of particle breakage to strength is it will increase the deviator stress until a certain point which is abnormally higher than usual. Furthermore, the dense sand will exhibit behaviour like loose sand as the peak strength doesn't appear in stress-strain curve. It is because the effect of dilation is diminished while excessive breakage occurs.

Candidate's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

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