Class II post-peak behaviour of cementitious material in uniaxial compression

Hongyu Wang\textsuperscript{1,2}, Arcady Dyskin\textsuperscript{2}, Phil Dight\textsuperscript{1}, and Elena Paternak\textsuperscript{3}
\textsuperscript{1}Australian Centre for Geomechanics, The University of Western Australia, Crawley, Australia
\textsuperscript{2}Department of Civil, Environmental and Mining Engineering, School of Engineering, The University of Western Australia, Crawley, Australia
\textsuperscript{3}Department of Mechanical Engineering, School of Engineering, The University of Western Australia, Crawley, Australia

An experimental study of post-peak behaviour of rock models in uniaxial compression under different controlling methods is presented. A series of mortar samples with different compositions are firstly tested into post-peak stages using the axial strain control. In axial strain control, all types of mortar samples including pure cement samples have unavoidable sudden failure beyond the peak stress at different stages, and therefore only limited post-peak stress-strain curves can be captured. In order to capture the post-peak stress-strain curves beyond the sudden failure, a failure control method based on controlling the rate of lateral strain is proposed in this study. Using this method, post-peak stress-strain curves with positive modulus could be obtained for class II behaviour. The failure modes of the samples tested in both axial strain control and failure control show similarity. Also, the failure-controlled experiments indicate that despite the unstable fracture growth in the samples being considerable after peak stress, it may not lead to the uncontrolled sudden failure of the whole sample but could produce a class II stress-strain curve.