THE DYNAMIC STRENGTH OF CEMENT PASTE UNDER SHOCK COMPRESSION

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Plate impact experiments on cement paste were performed to assess the dynamic strength of this material. Lateral stresses were measured by means of embedded manganin gauges. In combination with longitudinal stresses, measured in K. Tsembelis et al.[1], these results have been used to obtain shear strength under shock loading. Results suggest that the material is deforming in an inelastic manner with the shear strength being pressure dependent.

INTRODUCTION

Considerable interest in characterising the dynamic loading of concrete under impact conditions exists because of its extensive use as a structural material [2-5]. Concrete is a heterogeneous material containing aggregates in a cement matrix. Therefore characterisation under dynamic conditions is complicated compared to homogeneous materials. For instance, impedance differences inside the concrete emanating from its different constituents lead to variations in the particle velocities, longitudinal and lateral stresses. One way to study this material is to average these variations using a plate reverberation technique where a disc-shaped specimen the concrete is mounted on the projectile and undergoes planar impact on a stationary diagnostic target (PMMA, copper, tantalum) [2-5]. However, only the Hugoniot curve (longitudinal behaviour) can be found using this technique. For that reason, the material understanding has been gradually built up starting from studies of the matrix (cement paste) and individual aggregates. In this paper, results are presented on the lateral behaviour of the matrix material, which is combined with published longitudinal data under the same impact conditions to measure the shear strength of the cement paste.