Unreinforced masonry walls. Transversial and axially loaded
The present report concerns calculation of the load carrying capacity of laterally loaded masonry walls with small or without axial loads. The load carrying capacity will in both cases be calculated using the yield line theory, developed by Å. Ingerslev and K. W. Johansen for concrete slabs. In both load conditions, equations for the bending yield moments are established. The moments are calculated from an upper bound solution, where it is assumed that failure in most cases takes place in the interface between the mortar and the brick. The failure is a sliding failure, following Coulombs modified failure hypothesis. The tensile strength of the interface is neglected through the entire report. When using the yield line theory it is assumed that the rotation axes are placed at the face, where the transverse load is applied as compression. This together with the assumption of no tensile strength, lead to the result that the moment capacity in a horizontal yield line is zero. In the case of laterally loaded masonry walls it has been observed in experiments that initial cracking takes place in the bed joint before failure, indicating that the horizontal yield line has no moment capacity at failure. To justify the use of the yield line theory, the theory is compared with experiments. The yield line theory in the case of axial loads has to be adjusted compared to the usual theory by introducing the axial load in the external work. The external work is due to the expansion of masonry walls when they fail and is therefore negative, when the external load is compressive. In the report examples are produced to illustrate the use of the theory both in the case of no axial load and in cases with axial load. The yield line theory is in both loading cases compared with experiments on full size walls. The comparisons shows that the theory is in good agreement with reality. The tests used are taken from the literature.

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