Combined shear-flexural verification of in plane loaded reinforced and unreinforced masonry walls

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ABSTRACT

The safety verification of in plane loaded masonry panels requires the evaluation of at least three different collapse conditions connected with overturning, shear sliding and shear – compression failure at the panels' toe. In reinforced panels the resisting models should even take into consideration the presence of localised or distributed reinforcement.
In general the masonry is considered a Mohr-Coulomb type material not resisting in tension and plastic in compression, while reinforcement is a brittle elastic material resisting to tension [1].
The ultimate limit state is however linked with a given subset of compressed material inside the panel area. The compressed sections are therefore varying inside the panel as a function of the applied load. The collapse occurs in shear or overturning when one peculiar compressed section reduces to its minimum [2].
By equating the capacity in shear and overturning it is possible to derive an explicit statement of the minimum length of the compressed section which will be activated by a simultaneous failure in shear and overturning. A simple inequality is detecting the real failure mode and this allows directly computing the failure load resultant.
The procedure is very fast and can deal even with localised or distributed reinforcement layers such as fibre strips or mesh reinforced mortars.
Some examples of panels discussed in the literature show the effectiveness of the proposed verification procedure.

REFERENCES

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