Abstract

TITLE Contribution of shear deformation in fissured beams of reinforced concrete
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The contribution of shear strain in calculations of deflections and displacements is only considered relevant in elements with a small height-to-length ratio. These geometries are frequently found in non slender beams and in walls bearing loads contained in their own plane. As a general rule, this contribution is neglected for elements with a slender coefficient equal or higher than 5. The approximation is based on results obtained from static analysis of structures that confirm this notion.

In real situations, these elements bear a combination of bending and shear stresses, each leading to different crack patterns. Once diagonal fissures due to shear stress are present, their contribution to the resultant deformation might increase substantially and reach values that can not be neglected. This effect has been observed both in experimental studies and in numerical simulations that consider the coupling between shear and bending stresses.

Notwithstanding, a practical formulation to quantitatively asses what is the shear contribution to the deformation of a body with slanted fissures and in which cases that contribution is significant, is not currently available.

The final goal of this project is to address theoretically the effects of shear deformation in reinforced concrete bodies with fissures.
This work is grounded in parametric studies using a coupled numerical method for non linear analysis of reinforced concrete structures subjected to normal and tangential stresses.

As a first step, the model is validated by comparing its numerical predictions with experimental measures of shear and bending deformation measures reported in the literature. Following, a thorough parametric study is performed in order to asses the effect of different variables in rectangular cross section beams and beams in double T configuration in which the deformations have been calculated. Shear deformation accounts, in certain of the studied cases, up to 15-20 % of the overall defomation.

Finally, the analysis of the results obtained in the study allow to establish a general methodology to asses the contribution shear stress.