Shear-wall mock-up subjected to monotonic loading with concrete-steel bond model

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ABSTRACT

Reinforced concrete is widely used in civil engineering structures but may be concerned by cracking especially when concrete is subjected to tensile loadings. Crack initiation and propagation are related to the interface between steel and concrete which is responsible for stress transfer, especially during cracking. Taking into account the bond slip in a numerical simulation is thus a key point when cracking wants to be correctly captured.

This work presents a numerical simulation of a shear-wall mock-up subjected to monotonic loading with a new steel-concrete bond model. First, global responses (force-displacement curves) are compared to the experimental results and show a good agreement between simulation and experiment. In order to compare the local responses such as crack orientation, crack spacing and crack opening, a new post-processing method is presented. It is based on the definition of the crack path from the displacement field or the change in the sign of the bond slip. The crack opening is then obtained using the displacement in the normal direction of the crack. The method is applied on the shear wall and the results are compared to the experimental data obtained with digital image correlation. A good agreement is once again obtained.

REFERENCES

[1] A. Casanova, L. Jason, and L. Davenne, "Bond slip model for the simulation of reinforced concrete structure", Engineering and Structures, 39, 66-78 (2012).

[2] CEOS.FR French National Project, www.ceosfr.org, 2014