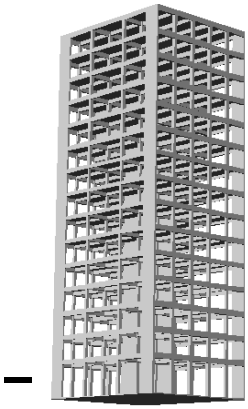

Abstract

This study focuses on the seismic response of walls which belong in dual (frame + wall) reinforced concrete structures, with particular emphasis on their bending and shear behaviour. For the purposes of this study, a 15-storey building was considered consisting of walls with unequal lengths (6 and 9*m*). This structure was designed on the basis of the EC 8 for two effective peak ground acceleration levels (0.16*g* and 0.24*g*) and two different ductility classes (H and M). The resulting different designs were then assessed by subjecting the structures to a suite of strong ground motions, carrying out inelastic time history analysis. The extreme values (envelopes) of the shear and bending response of the walls were obtained. These envelopes were then examined with respect to the inelastic response of the walls and compared to the provisions of modern seismic codes (EC8-2004, EAK 2003, NZS 3101-2006). It is found that (at least) for the design earthquake intensity, the first two modes of vibrations suffice for the true seismic response of the walls to be described. The envelope of the bending moments, as well as the base shear of each wall, is found to be strongly depended on how the yield moment at the base of the wall and the respective modal response (regarding the second mode of vibration) are related to each other. As far as the code's prescribed design action effects is concerned, only the NZS's were found to perform satisfactorily, while that was not the case for the EC8 ones (especially the envelopes of the bending moments). For this case a totally new method was proposed for the envelopes of the bending moments as well as for the shear forces. According to the proposed method, the envelope of the bending moments is described by a bilinear model, the middle point of which is defined with respect to the extend that the second mode of vibration affects the inelastic response of the walls. The latter stands also for the case of the base shear calculation. This totally new method seems to work better than the other procedures evaluated herein.