

ABSTRACT

After an earthquake, it is usual to find many building concrete structures that collapse or are out of service because of damage in the structural elements. Sometimes with the aim of strengthen and reduce the vulnerability of structures to having serious damage, or repair the structures that have already experienced an earthquake, different strengthening techniques arise. Steel caging (steel angles and stripes welded) is one of the techniques more extended around the world to strengthen the columns. However, currently there are not researches about the cyclic behavior of interiors beam-column joints when columns are strengthened with this technique.

Given the need to study this technique, a research was proposed entitled "Experimental and numerical study of beam-column and slab-column joints in strengthened RC columns" founded by Spanish Ministry of Science and Innovation under Research Project BIA 2008-06268. This research was carried out at the Institute of Concrete Science and Technology (ICITECH) of the Technical University of Valencia (Universitat Politècnica de València, UPV). This Thesis is enclosed in the research project mentioned, and intends to be a continuation of the work carried out by Gimenez (2007), Adam (2007) and Garzón-Roca (2013).

The principal aim of the present Thesis is to know the behavior of interior beam-column joints under cyclic loads. For this purpose, an experimental study of 20 full-scale interior beam-column joints was conducted. The specimen type was chosen as a representative part of RC frame structures under seismic behavior. The geometry and reinforcement of the specimens were performed according to usual building constructions only designed under gravity loads, without seismic details and with the assumption of strong beam-weak column concept. The columns were strengthened with steel angles and strips, and different types of connections through the joint were tested. These connections are used also as joint strengthening.

Very different responses of the specimens were found depending on the column-joint connection employed, beam reinforcement type, and the load combination applied on the specimens. Therefore, the conducted experimental program made possible to study the response patterns of the strengthened elements under cyclic load. Furthermore, it also allowed studying the improvement of the shear response of the interior beam-column joints.

Key words: RC interior beam-column joint, seismic strengthening, experimental study, steel caging, cyclic loads, gravity loads.