

## Cyclic Response of Reinforced Concrete Beam-Column Joint Strengthening by FRP

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**Abstract :** A large number of old buildings have been identified as having potentially critical detailing to resist earthquakes. The main reinforcement of lap-spliced columns just above the joint region, discontinuous bottom beam reinforcement, and little or no joint transverse reinforcement are the most critical details of interior beam column joints in such buildings. This structural type constitutes a large share of the building stock, both in developed and developing countries, and hence it represents a substantial exposure. Direct observation of damaged structures, following the Algiers 2003 earthquake, has shown that damage occurs usually at the beam-column joints, with failure in bending or shear, depending on geometry and reinforcement distribution and type. While substantial literature exists for the design of concrete frame joints to withstand this type of failure, after the earthquake many structures were classified as slightly damaged and, being uneconomic to replace them, at least in the short term, suitable means of repairs of the beam column joint area are being studied. Furthermore, there exists a large number of buildings that need retrofitting of the joints before the next earthquake. The paper reports the results of the experimental programme, constituted of three beam-column reinforced concrete joints at a scale of one to three (1/3) tested under the effect of a pre-stressing axial load acting over the column. The beams were subjected at their ends to an alternate cyclic loading under displacement control to simulate a seismic action. Strain and cracking fields were monitored with the help a digital recording camera. Following the analysis of the results, a comparison can be made between the performances in terms of ductility, strength and mode of failure of the different strengthening solution considered.

**Keywords :** fibre reinforced polymers, joints, reinforced concrete, beam columns

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