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Monitoring of cracking in reinforced concrete beam Under Shear Loadings by using Digital Image Correlation (DIC) and Acoustic Emission (AE)

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Abstract : in this paper, an experimental study is performed on reinforced concrete beams without transverse reinforcement. The kinematics of the diagonal crack was studied in beams, with a constant width of the cross section. The same longitudinal reinforcement ratio and the same shear-span ratio are retained. Three point bending tests are performed in order to obtain the global mechanical behavior. During these tests, strains in longitudinal reinforcement bars were recorded using strain gauges embedded on the steel surface. The Digital Image Correlation (DIC) technique is used to monitor cracking during mechanical loading, in order to measure the intrinsic parameters of the cracking process (crack opening, crack length, slip between lips of cracks) at different stage. In the other face of the beams, sensors of the acoustic emission were placed to record the damage evolution and to locate the movement of the crack during test. Both AE and DIC are efficient techniques to study the failure process of reinforced concrete structures.

Keywords : reinforced concrete, Digital Images Correlation, acoustic emission, shear cracks.