Comparing the Behaviour of the FRP and Steel Reinforced Shear Walls under Cyclic Seismic Loading in Aspect of the Energy Dissipation

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Abstract : Earthquakes claim thousands of lives around the world annually due to inadequate design of lateral load resisting systems particularly shear walls. Additionally, corrosion of the steel reinforcement in concrete structures is one of the main challenges in construction industry. Fibre Reinforced Polymer (FRP) reinforcement can be used as an alternative to traditional steel reinforcement. FRP has several excellent mechanical properties than steel such as high resistance to corrosion, high tensile strength and light self-weight; additionally, it has electromagnetic neutrality advantageous to the structures where it is important such as hospitals, some laboratories and telecommunications. This paper is about results of experimental research and it is incorporating experimental testing of two medium-scale concrete shear wall samples; one reinforced with Basalt FRP (BFRP) bar and one reinforced with steel bars as a control sample. The samples are tested under quasi-static-cyclic loading following modified ATC-24 protocol standard seismic loading. The results of both samples are compared to allow a judgement about performance of BFRP reinforced against steel reinforced concrete shear walls. The results of the conducted researches show a promising momentum toward utilisation of the BFRP as an alternative to traditional steel reinforcement with the aim of improving durability with suitable energy dissipation in the reinforced concrete shear walls.

Keywords : shear walls, internal fibre reinforced polymer reinforcement, cyclic loading, energy dissipation, seismic behaviour

Conference Title : ICCMCES 2020 : International Conference on Composites Materials in Civil Engineering Structures

Conference Location : London, United Kingdom

Conference Dates : February 13-14, 2020