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Experimental Study on the Seismic and Power-generation Performance of RC Shear Wall with PV Panel Attached

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ABSTRACT
BIPV is now widely used in office and residential buildings, but its seismic performance still remained vague especially when the photovoltaic (PV) modules are installed on high-rise building facades. A new form of reinforced concrete shear wall integrated with photovoltaic module is proposed in this paper, aiming to apply PV module to the facades of high-rise buildings. In this new form, the PV module is integrated with the reinforced concrete walls by U-shaped steel connectors through embedded steel plates. The lateral cyclic loading test is executed to investigate the seismic behavior, and the electric and thermal performance with different drift angles. The seismic behavior, including failure pattern, lateral force-top displacement relationship and deformation capacity were investigated. The power generation and temperature variation on the back of the PV module and both sides of the shear wall were also tested. Two main results are demonstrated through the experiment: 1) The U-shaped steel connectors provide enough deformation capacity for the compatibility of the PV module to the shear wall during the whole cyclic test. 2) The electricity generation capacity is effective and stable during this seismic simulation test.

KEYWORDS: *BIPV, PV module, U-shaped steel connector, seismic behavior, drift angle, electricity generation capacity, thermal performance*