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Seismic Performance Assessment of Steel Plate Shear Walls Incorporating Rubberized Concrete: An Experimental Approach

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Abstract: *Steel plate shear walls (SPSWs) have emerged as an efficient lateral load-resisting system for buildings in seismic regions. This paper presents an experimental investigation on the seismic performance of steel plate shear walls with rubberized concrete infill (RC-SPSWs). The study examines the hysteretic behavior, energy dissipation capacity, ductility, and failure mechanisms of RC-SPSWs compared to conventional concrete-filled SPSWs. Three full-scale specimens were tested under quasi-static cyclic loading to simulate seismic conditions. The rubberized concrete incorporated crumb rubber at replacement ratios of 0%, 15%, and 25% by volume of fine aggregates. Results demonstrate that RC-SPSWs with 15% rubber content exhibited superior energy dissipation capacity, increased ductility, and reduced strength degradation compared to conventional SPSWs. The 15% replacement ratio achieved an optimal balance between strength retention and enhanced damping characteristics. The findings suggest that rubberized concrete infill represents a sustainable approach to improving the seismic resilience of steel plate shear wall systems while addressing waste tire disposal challenges.*

Keywords: Steel plate shear walls, rubberized concrete, seismic performance, energy dissipation, cyclic loading, ductility, sustainable construction

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