

5. Research on the Seismic Performance of Structures with Graphite-Lubricated Sliding Mechanisms

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The authors have pursued research on structures designed to achieve both cost-effectiveness and high seismic performance by incorporating a sliding mechanism with graphite lubrication. This method makes use of inexpensive, widely available materials such as steel, concrete, and graphite. However, while theoretical studies, including numerical analysis, have demonstrated that such structures can effectively improve seismic response, their real-world characteristics have not been sufficiently verified experimentally. In particular, seismic response characteristics and long-term changes in the sliding interface have yet to be fully clarified. Our study investigated the seismic response characteristics of steel-frame structures with graphite-lubricated sliding surfaces in shaking table tests. The results show that vertical ground motion has little effect on the sliding behavior of the structures. Additionally, they show that the rubber restoration spring in the sliding layer effectively suppresses residual sliding displacement. Furthermore, the response of the superstructure under biaxial horizontal excitation was generally smaller than that observed under uniaxial excitation.

Keywords: free-standing structure, shaking table test, graphite lubrication