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Rehabilitation and strengthening of aged steel railway bridges in Japan

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In Japan, a half or even more of the existing bridges with a span exceeding 15 meters were predicted to be over 50 years old in next 10 years. Appropriate repair, strengthening, or replacement work should be performed on aged steel bridge structures to ensure they remain in good condition. A novel strengthening method using rubber-latex mortar, glass fiber reinforced polymer plates, lightweight rapid-hardening concrete, and reinforcement bars is proposed for strengthening short-span steel railway bridge superstructures and for improving the seismic performance of aged column structures. To confirm the effectiveness of the strengthening method, static loading test, impact test, and field test were performed on test specimens for short-span steel railway bridges, longitudinal-lateral beam connections as well as column structures. Numerical simulations have also been made for both laboratory and field tests. According to the obtained results, the present renovation method can significantly enhance the rigidity and load carrying capacity of short-span steel bridge superstructure, connections, and column structures, resulting in the extension of the residual service life and improvement of seismic performance of such structures.

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