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Analytical Study on Bearing Capacity as a Structural System of Corroded Steel Bridge

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1 Abstract

Deterioration of the road bridge built in the high growth period has become a big problem in Japan. Half of the reasons for rebuilding steel bridges are due to corrosion and many studies have been conducted on the load carrying capacity of girders with corrosion damage. On the other hand, the bridge is composed of multiple members such as main girder, lateral bracing and sway bracing. These members do not behave independently but behave as a structural system and have high redundancy. Many previous studies have focused on the load carrying capacity of corroded members independently and few studies focused on the evaluation of the system behavior and load carrying capacity of the bridge structures. It is required to clarify the structural system behavior of the bridge for more rational bridge design and repair reinforcement. In this study, full-scale FE analysis for most standard steel I-girder bridge considering corrosion damage was performed, and redundancy of the bridge structural system was examined varying corrosion position, corrosion degree, and number of main girder. According to the analysis results, a healthy girder resists the external load even after a girder with corrosion reaches the maximum load capacity and was confirmed that the maximum load capacity of the bridge system is much higher than that of the corroded girder end and has high redundancy. Furthermore, the difference on load-bearing capacity when the number of main girders is changed are clarified focusing on l collapse process.

Keywords: girder bridge, bridge system, load bearing capacity, corrosion.

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