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STRUCTURAL PERFORMANCE OF MODERN TIMBER BRIDGES IN JAPAN

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Abstract

Author has experimented actual modern timber bridges used glulam timber to investigate structural rigidity and static and dynamic characteristic on structural performance over about 24 years, and then has been evaluated structural performance of modern timber bridges based on field test data accumulated and three dimensional static and eigenvalue analyses. This study is investigated structural characteristics measured by field test immediately after the complation to modern 23modern timber bridges, and then evaluated actual structural performance for those bridges based on the static and dynamic characteristics such as static deflection static rigidity, natural frequency, damping coefficient, dynamic increment factor (impact factor), vibration serviceability and so on. As the results, the actual condition of modern timber bridges became clear that static flexural rigidity was bigger than the rigidity in the design, and that fundamental vertical natural frequency was almost equivalent to general highway bridges as steel and concrete bridges.

Keywords: modern timber bridge; structural performance; field test; structural analysis.

1 Introduction

The timber bridge with glulam is defined as a modern timber bridge. The modern timber bridges made by glulam timber have history of 30 years in Japan, and the bridges of 1000 over are constructed in this period. Though the most bridges are pedestrian bridges, the modern timber highway bridges of about 40 are constructed. The construction reason will be fundamentally large swell in the age and requirement for the society such as demand expansion and effective utilization of the local area material, effective utilization of thinning wood, advance on wood processing technology, request of the socioeconomic infrastructure investment in proportion to the upgrading society and creation of new timber bridge technology. Timber is sensuously gentler for the human than steel and concreting material, and it is features that it is the precious circulation resources which is also excellent in environment and is excellent in harmony with surroundings. From the purpose of validity verification for safety and designed values, the experiment in laboratory or actual bridge has mainly been carried out for new structural type and bridge using new material. However, the structural data by measurement of actual bridge is worldwide insufficient for the timber bridges. The experimental data by actual bridges speaks for itself to greatly contribute on maintenance and technology development for modern timber bridges.

From this fact, authors carries out the static and dynamic field test of actual bridges in throughout over about 24 years, and the measured data has been collected to investigate structural performance on structural rigidity and static and dynamic characteristics of modern timber bridges [1-17]. In this study, actual condition evaluation of structural performance is investigated based on the measured values of 23 modern timber bridges and the three dimensional structure analysis. In the

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