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INVESTIGATION OF STRUCTURAL PERFORMANCE OF HISTORICAL AMASYA HUNDI HATUN BRIDGE

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Abstract

Bridges have been built by many civilizations throughout history to connect the two banks of a river. There have been numerous historical bridges built in Anatolian geography because the area has served as a bridge to various civilizations. This study performed a structural evaluation of the Hundi Hatun Bridge in Amasya, Turkey. First, a 3D model of the bridge was created in a digital environment, and then static and dynamic analyses were performed with software using the ANSYS Workbench finite element method. The bridge demonstrated sufficient dimensions under static loads and in the modal analysis, although the arches were subject to translational movement in the flow direction of the river. In addition, linear and nonlinear material models were used to perform dynamic analyses, including bridge seismic analyses. The linear material model indicated that the bridge is safe, while the nonlinear material model revealed that damage may occur, especially at the abutments and peak regions of the bridge. Moreover, the bridge arch flatness was determined to be a very important parameter. The results of this study can be used to guide future restoration efforts.

Keywords: Cultural Heritage; Historical Bridge; Static and Dynamic Analysis; Linear and Nonlinear Material; Restoration.