

Sustainable Design of Coastal Bridge Networks in the Presence of Multiple Flood and Earthquake Risks

Authors : Riyadh Alsultani, Ali Majdi

Abstract : It is necessary to develop a design methodology that includes the possibility of seismic events occurring in a region, the vulnerability of the civil hydraulic structure, and the effects of the occurrence hazard on society, environment, and economy in order to evaluate the flood and earthquake risks of coastal bridge networks. This paper presents a design approach for the assessment of the risk and sustainability of coastal bridge networks under time-variant flood-earthquake conditions. The social, environmental, and economic indicators of the network are used to measure its sustainability. These consist of anticipated loss, downtime, energy waste, and carbon dioxide emissions. The design process takes into account the possibility of happening in a set of flood and earthquake scenarios that represent the local seismic activity. Based on the performance of each bridge as determined by fragility assessments, network linkages are measured. The network's connections and bridges' damage statuses after an earthquake scenario determine the network's sustainability and danger. The sustainability measures' temporal volatility and the danger of structural degradation are both highlighted. The method is shown using a transportation network in Baghdad, Iraq.

Keywords : sustainability, Coastal bridge networks, flood-earthquake risk, structural design

Conference Title : ICSCSE 2023 : International Conference on Sustainability in Civil and Structural Engineering

Conference Location : Madrid, Spain

Conference Dates : March 20-21, 2023