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Editorial

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Significant variations in earthquake ground motions have been measured at different supports of long span bridges. A variety of sources of Spatial Variation of Ground Motion (SVGM) sources may cause these variations. The SVGM is the result of the combination of three different components: the incoherency effect, the wave-passage effect, and the site effects. The incoherency effect may result from seismic wave reflections and refractions through the soil during the wave propagation while the wave-passage effect may be caused by difference in the arrival times of seismic waves at different points. However, the site effects are due to the spatially varying site conditions resulting from the differences in local soil conditions at different supports. In their paper, Nassira and Boualem present "Quantification of the effects of the spatial variation of ground motions on the seismic response of highway bridges". The authors analyze the stochastic responses of highway bridges to spatial variation of ground motions, employing the random vibration theory to study the effect of non-uniform seismic excitations on the bridge structure. The bridge response is evaluated in terms of the mean values of maximum displacements and bending moments. Analyses of both stationary and transient responses are performed. The results show that the stochastic dynamic responses related to site effects are mostly much greater than those calculated using uniform, delayed and incoherent seismic excitation assumptions. The natural vibration characteristics of bridge influence its seismic design, wind resistance design, response spectrum and harmonic response analysis. Some bridges are in the perennial water environment. When analyzing the dynamic characteristics of the bridge, usually only the impact of water or waves on the pier is considered, while the interaction effect between the water and the pier in the vibration process is typically ignored. Li et al study "Influence of pier-water interaction on natural vibration characteristics of bridge with complex piers in water", based on a continuous beam with 4-column pier. The authors employ establish an analytical model utilizing ANSYS, where the single column circular pier of 4-column pier is taken to discuss the range of water level. Then the influence of water on the natural vibration of single 4-column pier and the entire bridge is analyzed. With the continuous improvement of China' s infrastructure, the number of bridges is also increasing. This imposes a huge demand on bridge maintenance, where a key component of the bridge, the bridge rubber bearing plays an important role in ensuring safe operation of the bridge and normal flow of traffic. Once the rubber bearing is damaged, it will affect the stress state of the whole bridge structure and compromise traffic safety. Therefore, detection of the deterioration of rubber bearing is essential in bridge maintenance. BIM intelligent modeling is used to analyze the safety of the construction of prestressed concrete continuous girder bridges. The construction safety analysis system is used to analyze the binding data of construction safety, and the data is combined with the self-applicable equilibrium control and the game equilibrium control to build the construction scene safety objective function model. On this basis, combined with the control constraints of the whole life cycle, the statistical analysis regression model is used to build safety analysis model based on BIM. The whole life cycle safety intelligent analysis of the construction scene is realized, and the improved particle swarm optimization algorithm is used to solve the model by adaptive differential evolution, to shorten the calculation time of

the model. In “Safety BIM intelligent modeling analysis of prestressed concrete continuous girder bridge construction”, Li et al provide details of the analysis of stresses to ensure construction safety. According to records of China’s highway traffic accidents, collision between vehicles and guard rail, in which the vehicle breaks the guardrail is a serious concern for public safety. Proper design of guardrails could enhance safety of drivers and passengers and reduce economic losses. Li et al conduct “Simulation and performance analysis of passenger bus collision with rigid guardrail of expressway bridge”, to optimize configuration design of guardrail with the aim of reducing crash force.

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