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Editorial

In 2006, the PCI northeast bridge technical committee initiated the development of the northeast extreme tee (NEXT) beam section. The NEXT beams have shown several advantages over the traditional I-shaped and adjacent box beam sections. In current practices, the design live load moment, in an I-beam or box-beam in skewed bridges, is calculated in accordance with the LRFD approximation method with a live load distribution factor (LLDF) and a skew correction factor (SCF). In his paper, Huang presents "Lateral Distribution of Live Load Moment in Skewed NEXT Beam Bridges," for NEXT beam section. Bridge Weigh-in-Motion (B-WIM) is the theory of utilizing field measurements to infer the weights of the overhead traffic that passes at full highway speed. There exists a consensus that conventional instrumentation faces substantial practical problems that halts the feasibility of this theory, namely installation time and complexity, especially for high elevation bridges. In "Acceleration-Based Bridge Weigh-in-Motion," Mohammed and Uddin present an approach by moving from B-WIM system based on strain data to a B-WIM system based on acceleration records. Kalman-filter-based estimation algorithm is developed to estimate the state vector (displacement and velocities) using limited measured acceleration response. The measured response is transformed to the modal response using the pseudoinverse of the mode shape matrix, which allows utilizing limited measurements number during the estimation process. The estimated state vector is used to feed a moving force identification (MFI) algorithm that shows a good estimating for a quarter-car load. A challenge with MFI is the computational time needed to obtain results, especially when using 2-D or 3-D finite element models (FEMs) with large numbers of degrees of freedom (DOFs). In "Moving Force Identification for Real-Time Bridge Weigh-In-Motion", Mohammed et al. propose a technique to reduce the computational time, which allows for real-time load monitoring and the potential for control of overloaded trucks. The technique utilizes the most critical parts of the bridge eigenvectors instead of the full system eigenvectors. The selected parts include the DOFs for the elements where sensors are located, and DOFs of track elements, where vehicle axles interact with the bridge. Lightly reinforced mass concrete piers are seismically vulnerable due to their excessive weight and inadequate reinforcement. In "Numerical investigation of seismic rehabilitation of mass concrete piers of a railway bridge using post-tensioning technique," Tabar and Rahbar outline a method for seismic rehabilitation of such piers using post-tensioning technique. The paper postulates that a prescribed compressive stress about five percent of the pier axial strength can promote the lateral load-carrying capacity by 60 percent. The authors propose a methodology to estimate the amount of compression needed to achieve required strength and ductility.

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