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Editorial

The dynamic p-y method, based on the Winkler model, is a useful approach for designing bridges to resist seismic events. Further, this approach facilitates characterization of nonlinear dynamic soil-structure interaction while offsetting time and expertise that would otherwise be required to develop continuum-based models. In "Design-Oriented Seismic Soil-Pile-Superstructure Interaction Analysis using a Dynamic p-y Method", Taghavi et al. present their work on validating the nonlinear Winkler method—within bridge FEA software—and its employment of the computation of dynamic bridge foundation member response to seismic loading. Orthotropic steel decks (OSDs) consist of a complex network of stiffeners and the deck plate itself. Working as a whole, it takes part in the structural working of the overall bridge, which in its turn results in a lightweight and durable deck concept. Orthotropic steel decks are nevertheless very sensitive to fatigue damage, because of the large number of welded connections. Innovative research focuses on the application of fracture mechanics as well as the influence of residual stresses on the fatigue lifetime. De Backer et al present "Innovative fatigue design of orthotropic steel decks", in which they employ Linear Elastic Fracture Mechanics (LEFM). When opened in 1967, the San Mateo/Hayward Bridge crossing the San Francisco Bay south of San Francisco incorporated the United States' first major orthotropic steel bridge deck. The mile long orthotropic steel deck of the bridge was the largest in the world at the time. Over 40 materials were evaluated for the riding surface of the original orthotropic deck. Epoxy asphalt was chosen and remained in place well past its life expectancy until it was finally replaced in 2015 by a polyester concrete material. In "Initial and replacement riding surface for the orthotropic San Mateo/Hayward Bridge" Maggenti and Shatnawi chronicle the factors leading to the selection of the material and construction of the initial and replacement riding surface. The replacement needed to be done on a critical bridge in service connecting the East-Bay Area communities to San Francisco. This made accelerated construction a factor in choosing a replacement and motivated evaluation of polyester concrete as a possibility. Recent bridge projects have incorporated multiple hazards as independent threats on the system. Traditional design methods to handle each threat separately are expensive and can lead to conflicting requirements. In "Robust bridge design to blast, fire, and other extreme threats", Marjanishvili et al introduce the framework for a robustness-based design process. The outcomes are articulated through a series of generalized variables; topology (i.e., structural configuration relative to the site or location), geometry (i.e., layout of the structural load bearing elements), damage, and hazard intensity measures. The paper employs a probabilistic framework, which permits consistent characterization of the inherent uncertainties through the process. Rather than consider the global resistance as a sliding scale in relation to a fixed load, the authors propose to consider robustness as a fixed property of the system, that is, Robustness is a function of topology and geometry. As the number of requests for permits to use bridges by heavy trucks increases, there is a concern over the potential for rapid fatigue damage to the affected bridges. The damage may especially become critical for bridges that have been designed for lower truckloads than those currently used in practice. To limit damage, and to indirectly impose a limit on the number of overload permits, Jang and Mohammadi present "Bridge rating modification to incorporate fatigue damage from truck overloads". The authors introduce a modification factor in the bridge rating equation to incorporate the fatigue damage potentials from overloads. This factor is derived based on the amount of damage that a specific overload may cause and is found to be mainly affected by the current bridge age and the percentage of overloads in the entire truck load population. The paper introduces a modified equation for single and continuous span steel girder bridges with welded cover plates. The seismic retrofit of the Seto-Ohashi Bridges, which is a group of long span bridges crossing Seto-Inland Sea, started in 2013 and will be completed by 2020. The seismic performance verification of three suspension bridges (Shimotsui-Seto, Kita Bisan-Seto, and Minami Bisan-Seto Bridges) of the Seto-Ohashi Bridges started in 2014. These bridges are one of the longest highway-railway combined suspension bridges. Recently, large-scale earthquakes that were stronger than considered in the original design occurred in Japan. Therefore, the two types of large-scale earthquake motions coming from plate boundary and inland active faults, expected to occur in the future, were used in the seismic performance verification. In "Seismic retrofit design of highway-railway combined suspension bridges", Hirayama et al. provide details of the seismic retrofit.

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