

Investigation of Steel-Concrete Composite Bridges under Blasting Loads Based on Slope Reflection

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Abstract : In this paper, the effect of blasting loads on steel-concrete composite bridges has been investigated considering the slope reflection effect. Reasonable values of girder size, plate thickness, stiffening rib, and other design parameters were selected according to design specifications. Modified RHT (Riedel-Hiermaier-Thoma) was used as constitutive relation in analyses. In order to simulate the slope reflection effect, the slope of the bridge was precisely built in the model. Different blasting conditions, including top, middle, and bottom explosions, were simulated. The multi-Euler domain method based on fully coupled Lagrange and Euler models was adopted for the structural analysis of the explosion process using commercial software AUTODYN. The obtained results showed that explosion overpressure was increased by 3006, 879, and 449kPa, corresponding to explosions occurring at the top, middle, and bottom of the slope, respectively. At the same time, due to energy accumulation and transmission dissipation caused by slope reflection, the corresponding yield lengths of steel beams were increased by 8, 0, and 5m, respectively.

Keywords : steel-concrete composite bridge, explosion damage, slope reflection, blasting loads, RHT

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