

## The Effect of Traffic Load on the Maximum Response of a Cable-Stayed Bridge under Blast Loads

**Authors :** S. K. Hashemi, M. A. Bradford, H. R. Valipour

**Abstract :** The Recent collapse of bridges has raised the awareness about safety and robustness of bridges subjected to extreme loading scenarios such as intentional/unintentional blast loads. The air blast generated by the explosion of bombs or fuel tankers leads to high-magnitude short-duration loading scenarios that can cause severe structural damage and loss of critical structural members. Hence, more attentions need to put towards bridge structures to develop guidelines to increase the resistance of such structures against the probable blast. Recent advancements in numerical methods have brought about the viable and cost effective facilities to simulate complicated blast scenarios and subsequently provide useful reference for safeguarding design of critical infrastructures. In the previous studies common bridge responses to blast load, the traffic load is sometimes not included in the analysis. Including traffic load will increase the axial compression in bridge piers especially when the axial load is relatively small. Traffic load also can reduce the uplift of girders and deck when the bridge experiences under deck explosion. For more complicated structures like cable-stayed or suspension bridges, however, the effect of traffic loads can be completely different. The tension in the cables increase and progressive collapse is likely to happen while traffic loads exist. Accordingly, this study is an attempt to simulate the effect of traffic load cases on the maximum local and global response of an entire cable-stayed bridge subjected to blast loadings using LS-DYNA explicit finite element code. The blast loads ranged from small to large explosion placed at different positions above the deck. Furthermore, the variation of the traffic load factor in the load combination and its effect on the dynamic response of the bridge under blast load is investigated.

**Keywords :** blast, cable-stayed bridge, LS-DYNA, numerical, traffic load

**Conference Title :** ICBMSM 2015 : International Conference on Bridge Maintenance, Safety and Management

**Conference Location :** London, United Kingdom

**Conference Dates :** November 27-28, 2015