

You are cordially invited to a public lecture on "Behavior and Design of Steel and Composite Structures:



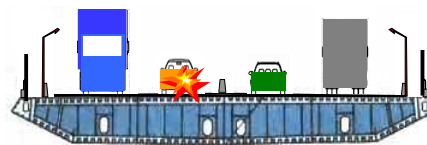
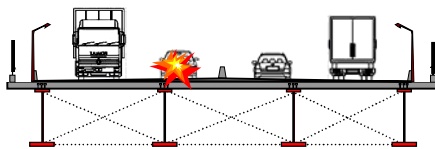
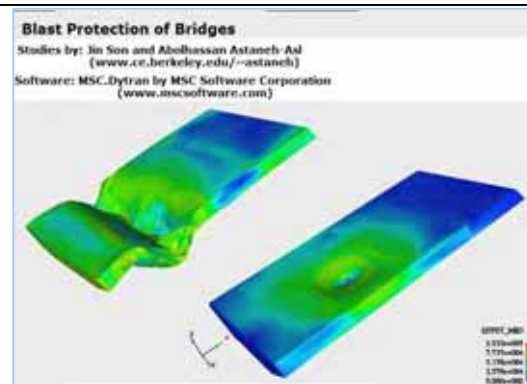
# Blast Protection of Bridges



By

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**Date and Time: Wednesday October 3, 2007, 4:00-5:00PM**  
**Place: 502 Davis Hall, UC Berkeley Campus**



**Abstract:** The main objective of research and technology development project conducted by Doctoral Candidate Jin Son and Professor Abolhassan Astaneh-Asl was to study effects of blasts due to car bombs placed on the deck of major steel bridges and to develop technologies that if implemented can prevent progressive and catastrophic collapse of these bridges and massive loss of lives. In this study, the performance of modern steel orthotropic decks as well as traditional steel plate girder –concrete slab decks of cable-supported bridges subjected to blast load is analyzed. The study is done by simulating blast as well as structural properties of typical bridge decks using MSC.Dytran finite element analysis software developed by MSC.Software Corporation. The car bomb detonation on the deck is assumed to be the most likely scenario to happen on a bridge. Air surrounding the structure and explosive device is also modeled to be able to transfer the blast effects to the structure. The main parameters of study were the size of explosives, properties of steel and concrete and the amount of axial load in the bridge deck. The effects of high strain rate on the material are also included. By conducting the dynamic analysis the failure modes are identified and strengthening measures to enhance blast-resistance behavior are developed and proposed. The measures if implemented, can help prevent progressive collapse of long span cable-supported bridges, such as suspension bridges, cable-stayed bridges and self anchored bridges, in the event of a terrorist blast attack. Special attention has been paid to present information in this lecture that can only be used to enhance the progressive collapse resistance of bridges and not to present information that can be used for malicious purposes.

**Sponsor: National Science Foundation ([www.nsf.gov](http://www.nsf.gov))**

The powerful analysis software, MSC-Nastran, used in these studies was generously donated to this project by the MSC Software Corporation ([www.mscsoftware.com](http://www.mscsoftware.com)).

