

The Current Practices of Analysis of Reinforced Concrete Panels Subjected to Blast Loading

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Abstract : For any country in the world, it has become a priority to protect the critical infrastructure from looming risks of terrorism. In any infrastructure system, the structural elements like lower floors, exterior columns, walls etc. are key elements which are the most susceptible to damage due to blast load. The present study revisits the state of art review of the design and analysis of reinforced concrete panels subjected to blast loading. Various aspects in association with blast loading on structure, i.e. estimation of blast load, experimental works carried out previously, the numerical simulation tools, various material models, etc. are considered for exploring the current practices adopted worldwide. Discussion on various parametric studies to investigate the effect of reinforcement ratios, thickness of slab, different charge weight and standoff distance is also made. It was observed that for the simulation of blast load, CONWEP blast function or equivalent numerical equations were successfully employed by many researchers. The study of literature indicates that the researches were carried out using experimental works and numerical simulation using well known generalized finite element methods, i.e. LS-DYNA, ABAQUS, AUTODYN. Many researchers recommended to use concrete damage model to represent concrete and plastic kinematic material model to represent steel under action of blast loads for most of the numerical simulations. Most of the studies reveal that the increase reinforcement ratio, thickness of slab, standoff distance was resulted in better blast resistance performance of reinforced concrete panel. The study summarizes the various research results and appends the present state of knowledge for the structures exposed to blast loading.

Keywords : blast phenomenon, experimental methods, material models, numerical methods

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