

PLASTIC HINGE FORMATION IN REINFORCED CONCRETE AND ULTRA HIGH PERFORMANCE CONCRETE COLUMNS UNDER BLAST AND IMPACT LOADS

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Given the prospective threat of a blast or impact load causing severe damage to structural systems, it is critical to investigate and understand their dynamic behavior and performance under such conditions. Columns are critical structural element, and their behavior under blast and impact loads was the focus of this study. Ultra high performance concrete (UHPC) is an emerging engineering technology characterized by increased strength and durability compared with normal and high performance concretes. As a relatively new material, UHPC remains to be fully characterized, and to study the material's response under simulated loading conditions contributes to widening its use, especially with respect to protective applications. The study examined the process by which plastic hinges form along the column, and the effect of such development on the columns' response under various boundary and load conditions. The considered normal strength concrete (NSC) and UHPC columns were addressed with both the fast running computer code DSAS, and the finite element program ABAQUS. The behaviors obtained from such simulations were compared, and conclusions were drawn about the various aspects of the simulations, the used parameters, and the observed structural behaviors.

This paper will summarize the study, the obtained results, and present conclusions and recommendations.