

peak wave, similar to that as observed in PC specimens, followed by multiple oscillating waves until the load is completely zeroed out. Loading of RC specimens is much longer than that of PC specimens. [Mindess and Bentur \(1985\)](#) observed a dissipation time of 70 ms compared to the 10 ms time as shown for PC specimens. This behavior was also observed by [Bentur et al. \(1986\)](#). Generalized behavior of impulse is given in the figure below.

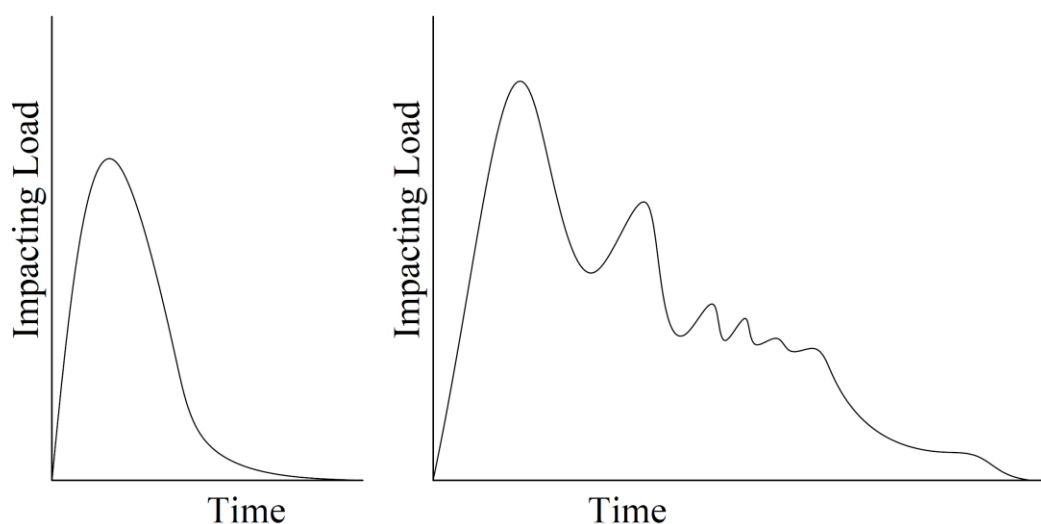


Fig 2 General impulse behavior of plain members [left];
Rebar-reinforced members [right]

4.3 Shear and Flexure Deficient Members

The impact behaviors of shear and flexure deficient beams are significantly different. In-depth studies done by [Kishi et al. \(2001 & 2002\)](#) highlight these variances. From these investigations, the authors were able to quantify the energy absorption of both shear and flexure deficient members in terms of the impacting reaction force and the accompanying residual deflection. For flexure deficient beams, the authors were able to simplify this relationship as a parallelogram, while shear deficient beams were observed to follow a triangular distribution.

Additionally for flexure deficient members, comparisons of the maximum observed reaction force with that of the static capacity showed the reaction force surpassed the design capacity by a factor of 2. As noted in the section above, not all impact energy is absorbed for fracture of the beam, the authors observed the ratio of absorbed energy to kinetic energy to be 0.7. In regard to shear members, these values were observed to be in the range of 1.5 to 2.5 and 0.60 for the ratio of reaction force to static capacity and the ratio of absorbed energy to kinetic energy, respectively.

5. CONCLUSION

The testing of beam members through the use of a drop weight machine provides valuable insight to the behavior of concrete beams under impact. However, due to the

uncertain nature of concrete dynamic behavior, there still exists much information to be obtained. While early tests were primitive in regard to the data collection techniques and instrumentation used. The data gained from recent tests have been able to provide much detail on the failure mechanism of various concrete beam configurations. As noted above, the study of fiber reinforced concrete matrices has been extensively conducted on plain and traditionally reinforced beam members with both normal and high strength concrete. However, there still exists much to be learned through the use of drop weight testing. Due to the unforeseen dynamic loading conditions, the understanding of structural failure under impact has become more relevant than in the past, and it is important to continue research in the area of concrete elements under impact.

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