Abstract

Impact loading design is crucial in specific structures, but there are no simpler method to design reinforced concrete members to impact loads other than performing extensive experimental works, studies and simulations, as the dynamic behavior of reinforced concrete member is harder to predict unlike reinforced concrete structural member under static load, which is commonly designed under the Ultimate Limit State. Therefore, this research aims to perform a parametric study on the dynamic behavior of the beams under impact loading.

Parameters including longitudinal reinforcement steel ratio, shear reinforcement steel ratio and aspect ratio is checked against the drop weight under Impact Loading Test, where the mid-span of the beam will be subjected to the applied load of a free-falling drop weight with a certain mass and velocity. The accuracy of the beam model for this project is validated to Fujikake et al.'s [8] experimental results on the impact responses of reinforced concrete beams by performing Finite Element Analysis using the software LS-DYNA. The exact same model is then used for the parametric study with varying parameters of interest as stated above.

Among the outcomes of this project include the maximum deflection at the mid span of the beam model, the maximum impact forces at failure experienced by the beam and the maximum reaction forces at the bottom supports of the simply support beam models. The purpose of this project is to have a better understanding on the impact responses of reinforced concrete beam, where the generated results may be used to validate or modify emperical formulas produced by other researches, or even create new ones regarding prediction of dynamic behavior of reinforced concrete beams.