**Introduction**

This study examined the effects of kinetic energy input during dynamic loading of concrete specimens. Two test methods could be used for such tests; with a drop hammer (DH) or with a Split Hopkinson Pressure Bar (SHPB). Both approaches were examined, and the results compared. The stress waves in these tests were investigated theoretically, and the role of the kinetic energy associated with such tests was examined. In addition, two Finite Elements models were developed in order to analyze the tests, and the results were compared with the theoretical findings. The conversion of the kinetic energy to strain energy was defined by using the theory of elastic waves. It was shown that part of the kinetic energy remained in the specimens, and the stress distribution along the specimen was not uniform. Finally, a short comparison of the SHPB and the drop hammer test were presented.

**Split Hopkinson Pressure Bar Device and Model**

The roll of kinetic and strain energies during the wave propagation was investigated using a SHPB FEM model and 1D wave propagation theory. In addition, the non-uniformity of strain distribution along the specimen was quantified. For this purpose, the model was loaded by a stress wave with a wave length equal to the specimen’s length. Four main interesting time points were predefined and are described below.

(A) “Wave 1st face” - the stress wave reach the first face of the specimen. (B) “Wave 2nd face” - the stress wave reach the second face of the specimen. (C) “Reflected wave 1st face” – the reflected wave from the 2nd face reach the first face. (D) between time marks (B) and (C) - the reflected wave from the 2nd face reach the specimen’s midspan (not marked on charts).

**Results and Conclusions**

- During the reflections within the specimen, kinetic energy converted to strain energy. This process was accompanied with high non-uniformity of the strain distribution along the specimen.
- When the maximum strain energy was achieved, the kinetic energy was at a minimum, but not zero. This explained the velocity of the specimen fragments during the dynamic failure.
- The maximum strain energy did not correspond to the maximum strain in the specimen.

**Drop – Hammer Test Device and Model**

- Load measurements are made by load-cells (LC) located at the bottom of the hammer.
- Strain measurements are made by strain-gauges (SG) located along the tested cylinder.
- A recorded stress, that was captured by the load cells during an experiment, was applied as a distributed load on the top of the FEM model’s cylinder.
- The model results were taken from elements along the cylinder.

**Drop hammer test Vs. SHPB**

<table>
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(A) Strain and kinetic energies at the specimen, (B) Average strain of the specimen (compression is positive), (c) SE/(G ε^2) vs. time, (d) Standard deviation of the strains in the specimen.