

## **The effect of combination between crumb rubber and steel fiber on impact energy of concrete beams**

**Ahmed Tareq Noaman, B.H. Abu Bakar, Hazizan Md. Akil**

The effect of combination between crumb rubber and steel fiber on low-velocity impact energy of concrete beams was determined in this study. Crumb rubber ranging in size from 1–2 mm was recycled from waste tires. This rubber was then incorporated into normal concrete (NC) and steel fiber concrete (SFC) mixes by partially replacing fine aggregate at two different ratios (17.5% and 20%) by volume. The beams examined in this study measured 500 mm × 100 mm × 100 mm. They were fabricated from NC and SFC with a volume fraction of 0.5% hooked-end steel fiber. A low-velocity drop hammer with a mass of 5.1 kg was dropped repeatedly from a height of 0.17 m until the initial crack was generated. The process continued until beam failure. Impact energy improved considerably at both initial crack and ultimate failure through the combination of steel fiber and crumb rubber. However, the partial replacement of fine aggregate by volume with crumb rubber reduced the compressive strengths of both NC and SFC mixes. Nonetheless, the synergy between crumb rubber and steel fiber is determined in this study for producing concrete with the desired properties, as well as to introduce an applicable solution for the problem of discarded tires.