

Load deflection behaviour and properties of sustainable lightweight aggregate concrete slabs

Sheelan Mahmoud Hama and Alhareth Muthana Abdulghafor

Abstract: This research has been conducted to investigate the effect of partial replacement of coarse aggregate by lightweight aggregate on different characteristics and load deflection behaviour of concrete. Natural aggregate was replaced once by waste walnut shell and then by porcelinate aggregate. And both types are considered lightweight aggregate. Percentages of replacement by volumetric rates ranging between 25% to 100% were adopted. In addition, cement was replaced by 10% waste glass powder. Compressive strength, splitting tensile strength, and dry density were made. Also, one-way slab was cast for 50% replacement and tested under four point flexural test. Results showed that replacement of natural aggregate with lightweight aggregate regardless of its source decrease density, compressive strength and splitting strength. While an increase in the deflection at failure was noticed for slabs incorporating lightweight aggregate compared to the reference one. Concrete containing 50% porcelinate demonstrated a slight increase in strength compared with the reference slab by 8.91% concrete containing 50% WA demonstrated a clear reduction in strength compared with the reference slab by 62.57%. The width of crack at failure for concrete incorporating walnut coarse aggregate was wider for the reference one. While concrete incorporating porcelinate failed with finer cracks than the reference one.