

Durability Properties of Oil Palm Shell Lightweight Aggregate Concrete Containing Fly Ash as Partial Cement Replacement

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Abstract:

Environmental degradation resulting from waste disposal from coal power plants and palm oil mills along with greenhouse gasses released by cement manufacturing industry needs to be resolved. Realizing that the use of zero granite lightweight aggregate concrete is rewarding in terms of environmental sustainability and construction cost reduction through reduced foundation size, the present research delves further in oil palm shell lightweight aggregate concrete research. The influence of fly ash as partial cement replacement on compressive strength, porosity and acid resistance of oil palm shell lightweight aggregate concrete were investigated. Five types of concrete mixes were casted by replacing fly ash from 0%, 10%, 20%, 30% and 40% by weight of cement. All the cubes were before subjected to air curing for 28 days. Testing to determine the compressive strength and porosity of concrete were conducted at 28 days of curing age. The acid resistance of concretes was evaluated by measuring the mass loss of the cubes after immersed in sulphuric acid solution for 75 days. The findings show that air cured oil palm shell lightweight aggregate concrete exhibit strength reduction and increment in porosity value when the fly ash added is increased. Concrete produced with lesser quantity of fly ash experience lower mass loss and strength reduction.

Keywords: Fly Ash; Partial Cement Replacement; Oil Palm Shell Lightweight Aggregate Concrete; Durability Properties; Acid Resistance; Porosity

Acknowledgement

The authors would like to acknowledge the financial support received from Universiti Malaysia Pahang through internal grant RDU190342