



Contribution ID: 328

Type: Poster

Effect of Lightweight aggregates prepared from fly ash on lightweight concrete performances

Thursday 25 May 2017 17:45 (15 minutes)

Lightweight aggregates were prepared from fly ash of by-products from the paper industry. The influence of the ratio of clay to fly ash and processing conditions on lightweight aggregates properties were investigated. It was found that the amount of fly ash directly affected to porosity of lightweight aggregates. Lightweight aggregates with the ratio of clay to fly ash at 80:20 wt% using the sintering temperature at 1210°C exhibits the bulk density of 1.66 g cm^{-3} and the compressive strength of 25 MPa. The replacement of coarse aggregates with lightweight aggregates at 100 wt% for concrete production showed the ultimate properties of concrete with density of 1780 g cm^{-3} , water absorption of 3.55%, compressive strength of 40.94 MPa and thermal conductivity of $0.77 \text{ W m}^{-1} \text{ K}^{-1}$. The concrete had more than 25% weight reduction while keeping a similar compressive strength to an ordinary concrete. This is revealed that lightweight aggregates could be applied into structural concrete because it was able to reduce work load and increase safety factor of construction.

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Session Classification: Poster Presentation II

Track Classification: Material Physics and Functional Materials