

Early-Age Mechanical and Thermal Performance of GGBS Concrete

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Abstract : A large amount of blast furnace slag is generated in China. Most ground granulated blast furnace slag (GGBS) however ends up in low-grade applications. Blast furnace slag, ground to an appropriate fineness, can be used as a partial replacement of cementitious material in concrete. The potential for using GGBS in structural concrete, e.g. concrete beams and columns, is investigated at Xi'an Jiaotong-Liverpool University (XJTLU). With 50% of CEM I replaced with GGBS, peak hydration temperatures determined in a suspended concrete slab reduced by 20%. This beneficiary effect has not been further improved with 70% of CEM I replaced with GGBS. Partial replacement of CEM I with GGBS also has a retardation effect on the early-age strength of concrete. More GGBS concrete mixes will be conducted to identify an 'optimum' replacement level which will lead to a reduced thermal loading, without significantly compromising the early-age strength of concrete.

Keywords : thermal effect, GGBS, concrete strength and testing, sustainability

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