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Recycling of Sewage Sludge Ash (SSA) as Construction Material

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Abstract : In Hong Kong, about 1,000 tonnes of sewage sludge were produced every day in 2014 representing a major fraction of the total solid municipal waste. Traditionally, sewage sludge is disposed of at landfills. This disposal method causes environmental issues and uses up precious space in landfills which are becoming saturated one by one. To tackle the disposal problem, Hong Kong government has just built a sewage sludge incinerator. Through incineration the volume of waste can be reduced up to 90% by converting sewage sludge into ash. Whilst sewage sludge ash (SSA) still needs to be disposed of at landfills, research has been conducted at the Hong Kong Polytechnic University on using SSA to substitute cement for the production of construction materials. Results demonstrated that SSA contained many open and isolated pores and thus can reduce the cement dilution effect resulting in only slight decrease in the flexural and compressive strengths of cement mortar. The incorporation of SSA in cement mortar can be up to 20% of the binder, without too much worry about adverse effect on strength development of mortar. There was some enhancement in strength using ground SSA in comparison to the original SSA. The original SSA shortened the relative initial setting time of cement paste but ground SSA caused slight delay in the setting of cement paste. The research also found that increasing the percentage of SSA lead to decreasing workability of cement mortar with the same water/binder ratio, and ground SSA was beneficial to workability although grinding increased the surface area of SSA. This paper summarizes the major findings of the research.

Keywords : cement replacement, construction material, sewage sludge ash, waste recycling
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