

Mechanical Properties of Cement Slurry by Partially Substitution of Industry Waste Natural Pozzolans

Authors : R. Ziaie Moayed, S. P. Emadoleslami Oskoei, S. D. Beladi Mousavi, A. Taleb Beydokhti

Abstract : There have been many reports of the destructive effects of cement on the environment in recent years. In the present research, it has been attempted to reduce the destructive effects of cement by replacing silica fume as adhesive materials instead of cement. The present study has attempted to improve the mechanical properties of cement slurry by using waste material from a glass production factory, located in Qazvin city of Iran, in which accumulation volume has become an environmental threat. The chemical analysis of the waste material indicates that this material contains about 94% of SiO_2 and Al_2O_3 and has a close structure to silica fume. Also, the particle grain size test was performed on the mentioned waste. Then, the unconfined compressive strength test of the slurry was performed by preparing a mixture of water and adhesives with different percentages of cement and silica fume. The water to an adhesive ratio of this mixture is 1:3, and the curing process last 28 days. It was found that the sample had an unconfined compressive strength of about 300 kg/cm^2 in a mixture with equal proportions of cement and silica fume. Besides, the sample had a brittle fracture in the slurry sample made of pure cement, however, the fracture in cement-silica fume slurry mixture is flexible and the structure of the specimen remains coherent after fracture. Therefore, considering the flexibility that is achieved by replacing this waste, it can be used to stabilize soils with cracking potential.

Keywords : cement replacement, cement slurry, environmental threat, natural pozzolan, silica fume, waste material

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