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A Study on the Effect of Nano-Silica on Mechanical and Durability Properties of High-Performance Concrete

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Abstract: *This study presents experimentally the combined effect of using Nano-silica, Alccofine, GGBS, and steel fibers on the mechanical properties of hardened concrete. Nano-Silica, Alccofine, and GGBS are used as partial cement replacement by different percentages, and Steel Fiber is used as volume substitution by different percentages. Compressive strength, splitting tensile strength, and flexural strength are evaluated using different combinations between Nano-Silica, Alccofine, and GGBS. Significant improvement in the mechanical properties of concrete is observed on using Nano-Silica due to its high pozzolanic activity. The Optimum content of Steel Fiber is improved splitting tensile strength by 1%t percentage respectively compared to control mix concrete. Utilizing Nano-Silica and GGBS with Steel Fiber leads to improving compressive strength compared to other concrete mixes. Flexural strength is doubled for using Nano-Silica, GGBS, and Steel Fiber compared to other concrete.*

Keywords: Nano-Silica, Alccofine, GGBS, Steel Fibers, Mechanical Properties & Durability

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