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Effect of calcium content on the Fresh and mechanical performance of engineered cementitious composite

This paper presents the effect of calcium content on the performance of Engineered Cementitious Composites (ECC). ECC is a newly developed high-performance fiber-reinforced cementitious composite with substantial benefits in both high ductility in excess of 3% under uniaxial tensile loading and improved durability due to intrinsically tight crack width. For this concrete mix was designed as ECC-45. The polyvinyl alcohol (PVA) fiber with a fraction of 2% was used in the research. Two different PVA-ECC concretes were produced using low lime fly ash (LCFA) and high lime fly ash (HCFA) with a fly ash-to-OPC ratio of 1.2. The effect of Fly ash on the fresh properties and setting time of ECC mixes were evaluated. The mechanical properties were also conducted by evaluating the compressive strength and flexural tensile strength. Scanning electronic analysis (SEM) was also conducted to clarify the bond strength of PVA fibers within the matrix of ECC specimens. The research findings demonstrated that ECC includes high calcium fly ash exhibits less workability than ECC includes low calcium fly ash. The mechanical performance of specimens including high calcium fly ash exhibits mechanical performance much more than low calcium fly ash due to the high bond strength between the PVA fibers and ECC matrix.

Keywords: Engineering Cementitious Composite, High calcium fly ash, High calcium fly ash, Compressive strength, and Flexural tensile strength

Biography:

Associated Professor; Academic Researcher in Duhok Polytechnic University, Duhok, Iraq. Got a bachelor's degree in Civil Engineering, from the University of Mosul, Iraq (1998-2002), and MSc and Ph.D. degrees in civil engineering-construction materials, from the University of Gaziantep, Turkey (2012-2018). Specialized in materials technology, Nanomaterials, High strength, and high ductility materials, Fiber-reinforced Polymer (FRP) Technology, Carbon Fiber-reinforced Polymer (CFRP), Basalt Fiber-reinforced Polymer (BFRP), Sulfuric Acid Attack, Magnesium Sulfate Attack, Seawater Attack, Engineered Cementitious Composite, Geopolymer Concrete, Self-compacting Geopolymer Concretes, Light-weight Concretes, and eco-friendly materials.

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