World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:11, No:03, 2017

Mechanical Properties and Microstructure of Ultra-High Performance Concrete Containing Fly Ash and Silica Fume

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Abstract : The present study investigated the mechanical properties and microstructure of Ultra-High Performance Concrete (UHPC) containing supplementary cementitious materials (SCMs), such as fly ash (FA) and silica fume (SF), and to verify the synergistic effect in the ternary system. On the basis of 30% fly ash replacement, the incorporation of either 10% SF or 20% SF show a better performance compared to the reference sample. The efficiency factor (k-value) was calculated as a synergistic effect to predict the compressive strength of UHPC with these SCMs. The SEM of micrographs and pore volume from BJH method indicate a high correlation with compressive strength. Further, an artificial neural networks model was constructed for prediction of the compressive strength of UHPC containing these SCMs.

Keywords : artificial neural network, fly ash, mechanical properties, ultra-high performance concrete
Conference Title : ICCCCT 2017 : International Conference on Cement, Concrete and Construction Technology
Conference Location : Miami, United States
Conference Dates : March 09-10, 2017