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Strength and ductility characteristics of polymer-modified csa cement concrete

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This study investigated the age-dependent strength and ductility characteristics of calcium sulfoaluminate (CSA) cement systems modified by an acrylic redispersible polymer powder. The effects of the polymer on the compressive strength and microstructure were examined from an early age of 2 h to 90 days. The macro- and microstructural characteristics of the hardened mortars and cement pastes were characterized by compressive strength tests, mercury intrusion porosimetry (MIP), powder X-ray diffraction (XRD), and scanning electron microscopy (SEM) with energy dispersive spectroscopy (EDS). The test results suggested that a higher dose of polymer powder not only delayed setting, hydration, and strength development, but also refined the pore structure of the cement systems suitable for achieving superior ductility. We believe that our study makes a significant contribution to the literature because it contributes to reducing the energy consumption and associated CO2 emission from cement production, specifically by providing information that can be used to enhance the mechanical characteristics of CSA cement systems.

Biography

Myoungsu Shin holds a B.S. (1994) and M.S. (1998) from Seoul National University and a Ph.D. (2004) from the University of Illinois at Urbana-Champaign. He has been on the faculty of the School of Urban and Environmental Engineering at UNIST since March 2010. Dr. Shin was previously an Assistant Professor at Morehead State University in Kentucky from 2004 to 2006. He is a licensed Professional Engineer in the U.S. with about four years of practical engineering experience at Rosenwasser Grossman Consulting Engineers in New York, NY. Prof. Shin is a member of many national and international, technical and administrative committees, including ACI-ASCE Committees 352 (Joints and Connections), 421 (R/C Slabs), and ACI Committee 374 (Performance-Based Seismic Design). His primary research interests include seismic design, modeling, and assessment of civil infrastructures, design optimization of tall buildings, high performance sustainable materials (e.g. fiber-reinforced, self-healing, sulfur composites), and non-destructive evaluation technologies.

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