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Junxia Li, En-Hua Yang

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Macroscopic and Microstructural Properties of Engineered Cementitious Composites Incorporating Recycled Concrete Fines

Junxia Li[a,b], En-Hua Yang[c,1]

[a]Interdisciplinary Graduate School, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798

[b]Residues & Resource Reclamation Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, 1 Cleantech Loop, Singapore 637141

[c]School of Civil and Environmental Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798

ABSTRACT

Recycled concrete fines (RCF) are fine aggregates and particles from the demolition waste of old concrete. Unlike recycled coarse aggregates, RCF is seldom used to replace sands in concrete due to its high surface area and attached old mortar on the surface of RCF. This study investigated potential use of RCF as microsilica sand substitute in the production of engineered cementitious composites (ECC), a unique high performance fiber-reinforced cementitious composites featuring extreme tensile strain capacity of several percent. The results showed that it is viable to use RCF as microsilica sand substitute in the production of ECC and the resulting RCF-ECCs possess decent compressive strength and strain capacity. Microstructure investigation on the component level revealed that RCF size and content modify matrix toughness and fiber/matrix interface properties. The influence of RCF size and content on ECC properties was clearly revealed and explained by the resulting fiber bridging $\sigma(\delta)$ curves of RCF-ECCs calculated from the micromechanical model. Micromechanics-

[1] Corresponding author. Tel.: +65 6790 5291; fax: +65 6791 0676. *E-mail address:* ehyang@ntu.edu.sg (E.H. Yang)