

## EXPERIMENTAL INVESTIGATION ON CREEP AND SHRINKAGE OF SELF-CONSOLIDATING CONCRETE – EFFECT OF FLY ASH

\*Ihab A. Adam<sup>1</sup>, Aaron K. Reihardt<sup>2</sup>, and Mahmoud M. Reda Taha<sup>3</sup>

<sup>1</sup>. Associate Professor, Construction Research Institute, National Water Research Center, Delta Barrage, Egypt, 13621

<sup>2</sup>. Department of Civil Engineering, University of New Mexico, MSC01 1070, 1 University of New Mexico, NM 87131-0001

<sup>3</sup>. Associate Professor, Department of Civil Engineering, University of New Mexico, MSC01 1070, 1 University of New Mexico, NM 87131-0001

### ABSTRACT

Self-consolidating concrete (SCC) is a relatively new category of concrete with a number of attractive properties, particularly in its fresh state. In spite of the innumerable research studies carried out on SCC, its time-dependent behavior including creep and shrinkage has not received ample attention. This paper presents the preliminary results of an on-going extensive experimental investigation performed to identify shrinkage and creep (under compressive stresses) of SCC. A test set-up was performed to enable sustaining the compressive stresses on the SCC creep specimens. Three different SCC mixes along with one normal vibrated concrete (NVC) mix were examined to investigate the effect of changing levels of fly ash on compressive strength, creep and shrinkage of SCC. Measurements on unloaded identical specimens were recorded to differentiate creep and shrinkage deformations. The experimental investigations suggested that SCC mixes showed different shrinkage performances compared with NVC mix, depending on its fly ash content. The higher the fly ash replacement ratio, the higher the total shrinkage of SCC. On the other hand, the opposite is true for basic shrinkage of SCC. Partial replacement of Portland cement with fly ash weakens the paste and reduces the compressive strength of SCC mixes. All SCC mixes experienced higher creep compliance than NVC due to the inclusion of fly ash. The effect of fly ash on creep compliance is similar to but more profound than its effect on total shrinkage strain of SCC. Increasing fly ash percent to 60% in SCC leads to a remarkably higher total creep compliance.

**Keywords:** creep, shrinkage, self-consolidating concrete, viscosity agent, fly ash.