1.14.9. NONINVASIVE EVALUATION OF FIRE-DAMAGED SELF-COMPACTING CONCRETE

Haddad R., Civil Engineering Department,
Applied Science University, Amman, Jordan;
Ababneh A., Amawi H., Odeh R., Civil Engineering Department,
Jordan University of Science and Technology, Irbid, Jordan

The potential of various well-known none-destructive testing techniques in detecting fire-damage in self-compacting concrete (SCC) was thoroughly investigated. For that, ordinary and high strength concrete cylinder (150×300 mm) and prismatic specimens (100×100×250 mm) were prepared at water-to-cement ratios of 0.4 – 0.5 using limestone and basalt aggregates before cured for 28 days and then exposed to environments having various relative humilities. After that, specimens were subjected to high temperatures ranging from 300 to 600°C for about 2 hours using an electrical furnace. Control SSC specimens were left at room temperature as reference. Heat damage of concrete was evaluated destructively and non-destructively using four testing techniques: ultrasonic pulse velocity, resonance frequency, Schmidt (rebound) hummer, and charging value. The mechanical properties and resonance frequency measurements were obtained using cylinder specimens that were tested before and after exposure to heating, whereas the ultrasonic pulse velocity and rebound number were obtained from measurements on SSC prisms. Sensitivity analysis indicated good potential in detecting heat damage using the above noninvasive testing techniques. Empirical models, developed between measured mechanical properties and damage indexes from different non-destructive measurement, showed very good correlation.