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Investigation the Effect of Nano–Particles and Recycling Mortar Additives on Physical and Mechanical Properties of Concrete

Abstract- *In this paper a lower ratio of nano powder were used from (Al_2O_3 and ZrO_2) (0.5, 1.5and 2. 5 wt %) from cement weight, the average particle size of nano-powder were (20nm). These powders were used in fabrication of Concrete with recycle fine aggregate was replaced Natural fine aggregate(sand) in order to be used in construction application and studies the effect on the concrete. Investigation were done on the concrete including dry density, water absorption%, porosity%, compression strength, and wear rate. The results shows that The nano-Al_2O_3, nano-ZrO_2, and recycle aggregate were adding causes difference effect in the physical and mechanical properties of concrete. Compared with control concrete specimens (Co) results for same curing time, the density, and compression strength of concrete were decreased with addition recycle fine aggregate(RFA), while wear rate, water absorption, and porosity % were increased, the lower values of density, compression strength were decreased by (2.3%, 10.8%), respectively, while the higher values wear rat for 7 and 28 day curing time, water absorption and porosity % were increased by (19.8%, 21.4%, 8.8%, and 5.6%), respectively were obtained with addition (50%)RFA. While, the addition nano-Al_2O_3 and ZrO_2 with RFA were increasing the density, and compression strength, but decreasing wear rate, water absorption, and porosity %, the higher values of compression strength was increased by (9.8%), while the lower values water absorption and porosity % were decreased by (24.1%, and 16.6%), respectively were obtained with addition (1.5%) of nano-Al_2O_3 and 50% RFA. But the higher values of density was increased by (9.8%) and lower values of wear rate for 7 and 28 day curing time were decreased by (71.1%, and 66.9%), respectively was obtained with addition (1.5%) of nano-ZrO_2 and 50% RFA.*

Keywords- *Nano-Al_2O_3, Concrete, Compression strength, Recycled fine aggregate, Nano-ZrO_2r, wear rate.*

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