

Abstract

This thesis presented the effect of limestone powder (LS) mixed with ground rice husk ash (GRHA) on the properties of Portland cement mortar. Two different sizes of the LS which had the volume-based particle sizes of 12 and 128 μm , and GRHA had a 29 μm in size at replacement levels of 5, 10 and 15 %wt. were used. The replacement levels of LS and GRHA in Portland cement Types I were 0%, 20%, 30% and 40% wt. of cementitious materials. The water-to-cementitious materials were controlled based on the water requirement conforming to flow value at $110\% \pm 5\%$. The properties tested were water requirement, compressive strength, air content, pore volume, calcium hydroxide content, drying shrinkage, autogenous shrinkage, the expansion and compressive strength loss due to sodium-and magnesium-sulfate solutions.

From comparison between the replacement levels of limestone powder with a particle size of 12 micrometers mixed with ground rice husk ash, and the replacement of purely ground rice husk ash. The limestone powder with a particle size of 12 micrometers could be improved powder material dispersion, resulted in the water requirement reduction, increased the early-age compressive strengths, reduced drying shrinkage and increased autogenous shrinkage, and reduced the expansion and strength loss due to sulfate solution. Whereas, the test results of TGA and MIP correspond to the results of compressive strength.

Whereas, the comparison between the replacements of limestone powder at particle size 128 micrometers mixed with ground rice husk ash and the replacement of purely ground rice husk ash. The limestone powder with a particle size 128 micrometers could be also improved powder material dispersion, resulted in the water requirement reduction, lower compressive strengths at the early stage, increased drying shrinkage and decreased autogenous shrinkage, and increased the expansion and strength loss due to sulfate solution. Whereas, the test results of TGA and MIP correspond to the results of compressive strength.