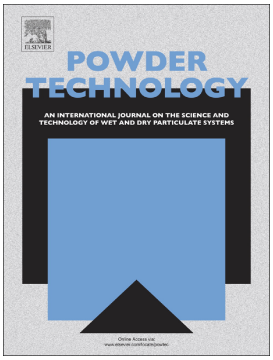

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Properties of 5-year-old concrete containing steel slag powder

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Abstract: The properties of 5-year-old concrete containing steel slag powder were investigated by determining the compressive strength, porosity, chloride ion permeability, morphology and composition of hydration products. The results show that compared with Portland cement concrete, the concrete containing steel slag powder with the same water-to-binder ratio still has low compressive strength, high interconnected porosity and low resistance to chloride ion permeability after 5 years. Long-term properties of concrete with steel slag powder are improved at low water-to-binder ratio. The higher compressive strength, lower porosity and very low permeability of concrete with higher content of steel slag powder are obtained at 5 years with constant 28 days' compressive strength. Many steel slag powder particles are still not fully reacted after 5 years. The structure of 5-year-old concrete with steel slag powder is much looser than that of Portland cement concrete. The hydration of RO phase is extremely slow even after 5 years. The poor bond between RO phase and hydration products negatively affects the long-term properties of concrete. The incorporation of steel slag powder decreases the Ca/Si and Ca/(Si+Al) ratios of C-S-H gel, but increases the Al/Si ratio of C-S-H gel.

Key words: Steel slag powder; Compressive strength; porosity; Permeability; Microstructure

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