

Enhancing corrosion resistance of RC pipes using geopolymer mixes when subjected to aggressive environment

الملخص باللغة الإنجليزية:

The durability of reinforced concrete (RC) pipes depends upon the corrosion resistance of the reinforcing steel and the resistance of concrete mixes against an aggressive environment. This research paper aims to compare the performance of R.C. pipes made of ordinary Portland cement (OPC) concrete mixtures with others made of two different geopolymer concrete mixes based on different ratios of granulated blast furnace slag (GBFS), fly ash (FA), and pulverized red brick (RB) subjected to three different environments, ambient, tap water (TW), and an aggressive environment, and a solution of 10% magnesium sulfates + 5% chloride (MS-CL). An accelerated corrosion setup has been applied to accelerate the corrosion process in the tested samples. The evaluation of change of compressive strength of concrete and microstructure of different mixes was investigated too. Fourier transform infrared (FTIR) spectroscopy has been studied on all pipes. Geopolymer concrete mixes based on 90% GBFS and 10% RB show better results in all cases. Geopolymer concrete mixes based on 63% GBFS, 27% FA, and 10% RB increase the concrete compressive strength in the magnesium sulfate and chloride environment by 5% compared to tap water. It can be concluded that the geopolymer concrete mixes produced of 90% GBFS and 10% RB perform well under all environments, and its microstructure shows stable behavior in an aggressive environment.

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