

A study of the relationship between permeability and tortuosity of concrete

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Abstract:

Permeability of concrete is often used as a key material property for assessing the durability of concrete. For a porous material, a relationship exists between permeability and tortuosity, both of which depend upon the pore formation and the connectivity of the pores. As concrete can be assumed as a porous material, it is of interest to see if a relationship exists between its permeability and tortuosity that can be utilized to determine permeability of a concrete by measuring its tortuosity. In this study, different concrete mixes were prepared using different water to cement ratios, cement contents and coarse to fine aggregate ratios to obtain data pertaining to permeability, tortuosity, porosity, and pore size distribution. The experimental data were used in Kozeny's equation that relates permeability to tortuosity and porosity for a porous material. An empirical relationship between permeability and tortuosity has been proposed based on the experimental data.