P R E F A C E

Concrete-polymer composite is one of the most advanced products of modern technology which can be successfully used in various technical applications. This particular type of composite is nothing but an interpenetrating network of inorganic polysilicate with organic polymers entangled with each other. Original concrete possess a porous structure composed of capillary pores and jel pores and the geometry as well as distribution of the pores change along with progress of hydration. By incorporating polymers into concrete pores products of improved mechanical and durability properties were made. Such type of composite materials find their application in various special construction works like high-way bridge decking and durable roads, low cost housing for migrant workers, plants for water desalination at high temperature ($140^{o}C$), storage bunkers and structure for under-water application and underground mine support etc.

Though polymer impregnated concrete systems (PIC) have been extensively studied by different workers, the mechanism of improvement in structural properties and durability has not been clearly established. Also it was not clearly known what role the polarity of impregnating polymer and the concrete-polymer interfacial interaction play in improvement of mechanical properties and durability.

The present investigation aims at providing further information on the role of polymer in the reinforcement of PICs, the effect of polarity of impregnating polymers on the strength properties, the nature and effect of concrete-polymer interaction and to find out a suitable mechanism of reinforcement of PICs.

The present thesis consists of six chapters. Chapter 1 contains review of the current literature on the present state-of-the-art of polymer impregnated concrete. Chapter 2 describes the experimental procedure of preparation of polymer impregnated concrete and the physical testing methods. Chapter 3 discusses the mechanical properties particularly compressive strength and flexural strength of the PICs prepared. Chapter 4 contains the studies on the durability properties of various PICs prepared and their durability mechanism. Chapter 5 discusses the role of interfacial interaction in polymer impregnated concrete and the mechanism of reinforcement of PICs. Chapter 6 summarises all the studies carried out in the present investigation.

Previous theories attributed the improvement in strength properties and durability of PIC to the pore filling effect of polymer. In the present investigation we have found that concrete-polymer interfacial interaction plays a significant role in determining the extent of reinforcement along with the pore filling effect of polymer.

With better understanding in the mechanism of reinforcement by impregnated polymer in the concrete specimen it is expected that diversification in the application of PICs and related composites may be attempted. Better technology of fabrication of such composition may enhance the attractiveness of cost benefit-ratio of PICs for further commercial application.

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