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MULTI-CRITERIA OPTIMAL DESIGN METHODOLOGY FOR DURABLE RC MEMBERS IN CORROSIVE ENVIRONMENTS –AN EXPERIMENTAL INVESTIGATION

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Abstract: The problem of searching for an optimal-design of durable reinforced concrete structural members in corrosive environments is a multi-dimensional one that can be satisfactorily only if all design variables are accounted for in a measurable and unified format. To this end, a design methodology would require: (1) simultaneous optimization of concrete mix proportioning to minimize design-costs of concrete while satisfying principal requirements for strength, and durability, and (2) definition and incorporation of a target service structural life as a design constraint. It is however noted that in the available literature on designs durable RC structural members, the issues of structural durability and design economy not been studied in an integral format. These two design considerations in corrosive environments are implicitly inter-related in a rather complex manner and a meaningful (unified) design methodology should account for the multi-criteria design relationships.

Based on identification of most influential design variables for RC structures, this paper *mainly* intended to: (1) report a review of key previous studies on corrosion-rate measurements of steel-bar embedded in a concrete matrix exposed to simulated corrosive conditions, (2) outline the methodology of current research activities that aim at developing a multicriteria approach for optimal design of durable RC members in chloride contaminated environments, and provide an overview of sample initial results obtained.

Keywords: multi-criteria optimal design, RC durable designs, RC design service life