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Material Mechanical Properties Necessary for the Structural Intervention of Concrete Structures

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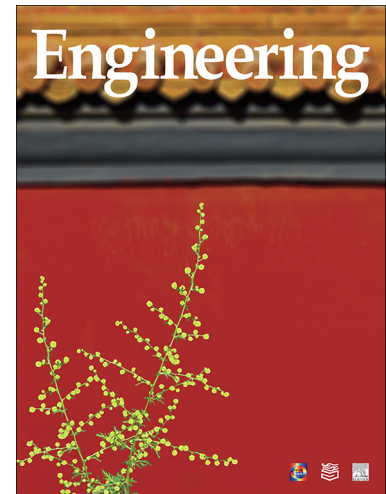
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Research**High performance structures: building structures and materials—Article****Material Mechanical Properties Necessary for the Structural Intervention of Concrete Structures**

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ABSTRACT

Structural intervention involves the restoration and/or upgrading of the mechanical performances of structures. In addition to concrete and steel, which are typical materials for concrete structures, various fiber-reinforced polymers (FRP), cementitious materials with fibers, polymers, and adhesives are often applied for structural intervention. In order to predict structural performance, it is necessary to develop a generic method that is applicable to not only to steel, but also to other materials. Such a generic model could provide information on the mechanical properties required to improve the structural performance. External bonding, which is a typical scheme for structural intervention, is not applied for new structures. It is necessary to clarify material properties and structural details in order to achieve better bonding strength at the interface between the substrate concrete and an externally bonded material. This paper presents the mechanical properties of substrate concrete and relevant intervention material for the following purposes: ① to achieve better shear strength and ultimate deformation of a member after structural intervention; and ② to achieve better debonding strength for external bonding. This paper concludes that some of the mechanical properties and structural details for intervention materials that are necessary for improvement in mechanical performance in structures with structural intervention are new, and differ from those of structures without intervention. For example, high strength and stiffness are important properties for materials in structures without structural intervention, whereas high fracturing strain and low stiffness are important properties for structural intervention materials.

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