

Material Conditions Necessary for Strengthening Concrete Structures

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Abstract

Maintenance and repair of accumulated infrastructures to prolong their service lives is a major challenge by construction field to achieve sustainability. Strengthening is often needed for deteriorated and inappropriately constructed structures. Structural ways and materials for strengthening are in a big variety, implying that we have not known the optimum way for strengthening. External bonding, as a strengthening way, has introduced a new type of failure mode, debonding (peeling). Material properties to improve debonding strength are new to structural engineers. Strengthening materials as a substitute of steel, such as fiber reinforced polymers (FRP), have quite different material properties. Conventional concepts for structural design and material are no longer true for those materials. As a structural material, durability is important, but we do not have enough data for durability of the new strengthening materials. This paper explains the material properties/conditions necessary for strengthening and suggests the necessity of closer collaboration between material scientists and structural engineers.

Keywords : Debonding, adhesive layer, strengthening material, stiffness, fracturing strain.