

## Development of Tensile Stress-Strain Relationship for High-Strength Steel Fiber Reinforced Concrete

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**Abstract :** This paper provides a tensile stress-strain ( $\sigma$ - $\epsilon$ ) relationship for High-Strength Steel Fiber Reinforced Concrete (HSFRC). Load-deflection (P- $\delta$ ) behavior of HSFRC beams tested under four-point flexural load were used with inverse analysis to calculate the tensile  $\sigma$ - $\epsilon$  relationship for various tested concrete grades (70 and 90MPa) containing 60 kg/m<sup>3</sup> (0.76 %) of hook-end steel fibers. A first estimate of the tensile ( $\sigma$ - $\epsilon$ ) relationship is obtained using RILEM TC 162-TDF and other methods available in literature, frequently used for determining tensile  $\sigma$ - $\epsilon$  relationship of Normal-Strength Concrete (NSC) Non-Linear Finite Element Analysis (NLFEA) package ABAQUS® is used to model the beam's P- $\delta$  behavior. The results have shown that an element-size dependent tensile  $\sigma$ - $\epsilon$  relationship for HSFRC can be successfully generated and adopted for further analyzes involving HSFRC structures.

**Keywords :** tensile stress-strain, flexural response, high strength concrete, steel fibers, non-linear finite element analysis

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