

Three-Dimensional Modeling of Concrete Reinforced with Randomly Distributed Fiber

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Abstract - Fibers are used in concrete structures to improve its behavior under load. The addition of fibers in concrete matrix increases the difficulty to study the mixture properties as fibers are randomly distributed inside concrete. The ability of fiber to randomly dispersed is very important in the material micro level and provide a crack arrest mechanism to improve the mechanical properties.

The objective of this paper is to provide an algorithm that accounts for fiber randomness in angle and location in the microstructure level of the material. This algorithm can be then used in Finite Element (FE) to investigate the Fiber Reinforced Concrete (FRC) under flexural loading. The numerical simulations of the specimen under flexural loading agree well with test observations, which reveal that the algorithm can simulate the material microstructure level properties and finite-element analytical approach can give reliable predictions.

Keywords: Fiber Reinforced Concrete; FRC; Algorithm; Random fibers; Finite element; flexural load; ANSYS