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Quantitative characterization of accelerated aging in cement composites using flexural inverse analysis

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1 Quantitative Characterization of Accelerated Aging in Cement Composites using Flexural**2 Inverse Analysis****3 Vikram Dey¹, Barzin Mobasher²****4 Abstract**

5 A constitutive model consisting of a tri-linear tensile stress-strain with residual strength was
6 applied in characterization and prediction of long term flexural behavior of several cement-based
7 composite materials. Flexural test results were back-calculated to obtain material parameters and
8 establish their relationship with aging. The material behavior is described by tensile stress-strain
9 parameters consisting of elastic modulus, first cracking strain, post cracking stiffness, ultimate
10 strain, and a residual strength parameter. The relationships between the material parameters and
11 age were established by studying the time dependent flexural performance of various composites
12 with glass and natural fibers as reported by Litherland et al. (1981), Marikunte et al. (1997),
13 Bartos et al. (1996), and natural fibers reported by Toledo-Filho et al. (2000). An analytical
14 model for prediction of rate and extent of damage as a function of time and temperature is
15 proposed for degradation of flexural behavior of strain softening and hardening fiber reinforced
16 concrete subjected to aging. This model is applicable to long-term durability of different classes
17 of materials subject to accelerated aging under different environmental conditions.

18
19 **Keywords:** accelerated aging, durability, natural fibers, glass fibers, flexure, inverse analysis

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