

1. Material Properties of Strain-Hardening Cementitious Composites

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An increasing number of high-rise condominiums recently have center core walls. The beam that interconnects core walls frequently has a short span and is therefore subjected to high stress during an earthquake and the drift angle inevitably becomes large. An attempt has therefore been made to apply strain-hardening beams with greater shear strength and ductility than conventional reinforced beams to the beams that interconnect core walls. For the strain-hardening beams, strain-hardening cementitious composites (SHCC), mixture of mortar and vinylon fiber, are used. SHCC are a new material with a different composition than conventional concrete and no material properties have yet been fully identified. Then, we have examined the material properties and durability of SHCC. The following results have been obtained.

- (i) The Young's modulus of SHCC can be evaluated by equation (1).
- (ii) The tensile strength obtained by tensile tests of the Building Research Institute can be roughly evaluated by equation (3).
- (iii) The calculated value of tensile strength derived from bending tests of SHCC can be used to estimate the tensile strength obtained using dog-bone specimens and that obtained in tensile tests of the Building Research Institute.
- (iv) In an accelerated carbonation test, the depth of carbonation was approximately 20 mm at an age of 194 days during the accelerated carbonation. At the rate of carbonation, the depth of carbonation in SHCC members was expected to be approximately 28 mm during the service life of the building, or during a 100-year period, well below the depth of covering.
- (v) If an air content is assumed to be approximately 8%, SHCC will remain adequately resistant to freezing and thawing.

Key words : strain-hardening fiber-reinforced cementitious composites, SHCC, material properties, durability