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SELF-CENTERING CAPACITY OF SUPERELASTIC SHAPE MEMORY ALLOY FIBERS IN MORTAR

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This study investigated the effects of geometric parameters, diameter and crimped length, of superelastic shape memory alloy (SMA) fibers on their pullout displacement recovering capacity. For this purpose, three diameters of 0.5, 0.7 and 1.0 mm and two different crimped lengths of 5.0 and 10.0 mm were considered for short fibers to be fabricated, with a length of 30 mm, employing NiTi SMA Wires. The superelastic SMA wires had similar stress-strain behaviour and temperature characteristics of phase transformation. As previous studies indicated that the spear-head end provided greatest anchoring action compared with other types of end shapes, to provide anchoring action during the pullout test, fibers were crimped at the end part and spear-head end was created. To conduct pullout tests, mortar specimens with compressive strength of 84 MPa were prepared with a square shape at the top and dog-bone shape at the bottom to be fixed in the grip. The embedded length of each fiber in the mortar specimen was 15 mm. The pullout test was performed with displacement control to obtain monotonic or hysteretic behaviours. The results showed that pullout displacements were recovered after fibers slipped. The superelastic SMA fibers with larger diameters showed better pullout displacement recovering capacity. All fibers showed the flag-shaped behaviour, and the fibers of 1.0 mm showed the clearest flag-shaped behaviour. It was also observed that the length of fiber cramping did not affect the pullout resistance of the superelastic SMA fibers.

Biography

Eunsoo Choi is a Professor in Hongik University, Seoul, Korea. He received his BS and MS from the Hanyang University in Seoul, and his PhD from the Georgia Institute of Technology, Atlanta, GA. His research fields include the Application of Shape Memory Alloys for Civil Engineering Structures and Seismic Retrofits for Reinforced Concrete Structures.

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