Measurement of interfacial bond properties in GRC using a fibre push in test

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Summary

Glass fibre reinforced cement (GRC) differs from other fibre reinforced cement composites in that its basic reinforcing element is a fibre strand or bundle, instead of a single fibre. Typically, the number of fibre filaments per bundle varies from 20 to 400, and the diameter of the filament ranges from 8 to 20 μm. An important feature associated with the bundle structure of the reinforcement is the continuous change of interfacial microstructure with age when exposed to wet environment. It has been widely recognised that the ageing performance of GRC and the reinforcing efficiency of the fibre bundle strongly depends on the interfacial characteristics/properties. Study of the interfacial properties in GRC, particularly in the aged composites, however, has proved to be difficult due to the brittleness and small diameter of the fibre reinforcement.

This paper reports a fibre push-in test which allows properties of fibre-matrix and fibre-fibre bond in aged GRC to be measured successfully. An unique nanoindentation equipment with improved accuracy in sample positioning and load-displacement measurements was used for the fibre push-in test. The overall objective of this study was to quantitatively assess the interfacial properties of GRC before and after ageing and the effect of matrix modification by metakaolin.

Keywords: bundle, fibre bond, interfacial, metakaolin.