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Improving the flexural strength of reinforced lightweight concrete beams damaged by high temperature using MICP technology

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ABSTRACT

High temperatures can reduce the flexural strength of reinforced concrete beams. This study uses microbially induced calcium carbonate precipitation (MICP) technology to enhance the flexural strength of thermally damaged lightweight aggregate concrete (LWAC) beams. Two experimental groups (A and B) were prepared with lightweight aggregates (LWAs) that were immersed in nutrient and bacterial solutions, while a control group (C) used LWAs without immersion. The specimens repaired themselves differently after exposure to 500 °C. Groups A and C used the same self-healing method, requiring 28 days of daily water spraying to maintain moisture. Group B employed a cyclic curing method, alternating nutrient solution spraying and air drying over the same period. After 28 days, the relative maximum flexural load ratios for groups A, B, and C were 1.094, 1.134, and 1.056, respectively. Groups A and B showed increases of 3.6% and 7.4% compared to Group C, demonstrating the cyclic curing method's greater effectiveness.

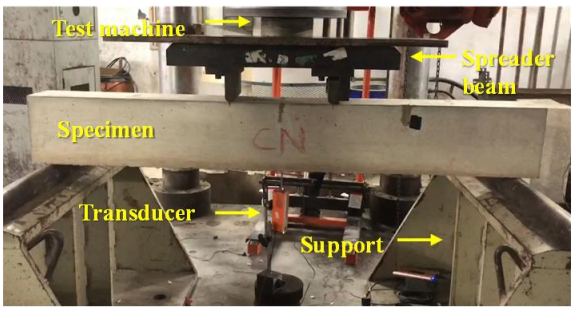

Fig. 1 Device diagram of beam flexural test

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