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Theory and Application of New Automated Concrete Curing System

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Abstract

The traditional curing method of concrete members in China is through manual water curing based on the experience of engineers and at an arbitrary time. This method, however, may induce early-age cracks and reduce durability of materials. In this paper, an automated curing system is proposed, which can decrease and even eliminate the early-age cracks by controlling the relative humidity and temperature of the concrete. More specifically, (1) the interval time of curing spray, calculated based on the cement hydration and real-time monitored data, is automatically identified by a programmable logic controller; and (2) the fog spray curing is operated under a constant water pressure by a variable frequency technology. A field test was conducted on 20 box-section beams to evaluate the performance of the proposed system based on the temperature evolution, humidity variation, and compressive strength of the concrete. Compared with the traditional manual water curing, the concrete beams cured by the automated system show higher early-age compressive strength, better appearance without

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