

Genetic Searching for Optimized Closure State of CFST Arch Bridge Construction

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ABSTRACT

It is very difficult to find the initial state of the backward analysis in a traditional simulative calculation of bridge construction because of the bearing peculiarity of the Concrete Filled of Steel Tubular (CFST) arch bridge. In this paper, the genetic algorithm had to search for the optimized closure state in the arch-rib construction, which can be taken as the initial state for the backward analysis. According to the detailed analysis, the objective function was determined, which included the adjustment increment of cable length as the variable parameter. But the objective function could only be obtained by the structural simulation calculation, which makes the searching more complicated. Hence a method using floating-point genetic algorithm was adopted and the genetic operation was adjusted to improve the precision and speed of the genetic search. Finally the optimized closure state in arch-rib construction was obtained with an improved genetic algorithm in an example calculation. It was shown that the results of the method could be used as the initial state for the backward analysis.

Keywords: CFST Arch Bridge, Simulative Calculation of Construction, Backward Analysis, Genetic Algorithm, Floating-point Coding