



Design and Dehumidification Effect of Dry Air Dehumidification System Inside the Main Cable

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Abstract

To improve the durability of the main cable of the suspension bridge, a new dehumidification system for delivering dry air from the interior of the main cable is proposed. The dehumidification system delivers dry air through the dry air supply conduct embedded inside the main cable, which can improve the dry air delivery efficiency. Based on the 1560m long-span suspension bridge of Longtan Yangtze River Bridge, the overall design of the new dehumidification system of the main cable is carried out. The components of the new dehumidification system are designed, the key technologies for the design of the new dehumidification system are clarified, and the corresponding solutions are proposed. To verify the dehumidification effect of the new dehumidification system, the main cable dehumidification test was carried out to test the relative humidity change pattern inside the main cable during the dry air delivering process. The test results show that the new dehumidification system has a good dehumidification effect and can be used to protect the main cable of the long-span suspension bridge against corrosion.

Keywords: main cable of suspension bridge; high-strength steel wire corrosion; dehumidification system design; dehumidification effect.

1 Introduction

The main cable is the load-bearing component of the long-span suspension bridge, which is almost irreplaceable in the operation stage. So, it is called the "lifeline" of the suspension bridge [1]. The main material of the main cable is high-strength steel

wire, which is easily corroded in a high humidity environment, affecting the bearing capacity and durability of the main cable. The main cable opening inspection in recent years found that the corrosion of the high-strength steel wire is quite serious [2-3]. How to slow down the corrosion rate of the steel wire and improve the durability of the main cable deserves further study [4-6].