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Theoretical study and parameter optimization of CFST pillar in cooling tower

The application of concrete pillar in cooling towers has become more common. However, the Concrete Filled Steel Tube (CFST) pillar has no relevant applications and researches in cooling towers. In order to research the CFST pillar, we will analyze the optimization of the parameters of the CFST pillar first. In CFST pillar, the parameters that can be optimized are the position of the intersection (above, below or in the middle), the cross angle, the tilt angle of the CFST pillar, the form of the intersection, the form of the pillar section, etc. Changes in these parameters can also cause a large change in the CFST pillar internal force. The purpose of this paper is to obtain the optimal value range of intersection position, cross angle and CFST pillar tilt angle in the CFST pillar parameters through theoretical calculations and to provide parameters selection suggestions for cooling tower engineering design. The main theories adopted are classical structural mechanics (e.g. force method, displacement method, moment distribution method, graph multiplication, etc.), moment distribution method of space rigid frame and transformation rule of space coordinates. We analyze the CFST pillar by three-dimensional structural mechanics and use Matlab to obtain the optimized results of CFST pillar parameters. The position of the intersection point is better above the middle of CFST pillar, the range of ratio λ is 0.2~0.35; the optimal value of cross angle α is 18°~22°; the optimal range of CFST pillar tilt angle β is 74°~78°.

Biography

Xiaoxiong Zha is a third-level Professor and Doctoral Tutor at Harbin Institute of Technology. He is the President of 7th and 8th China Association of Steel Concrete Composite Structures (CASCCS), Executive Director of China Steel Structure Association and Member of the China Steel Structure Association Expert Committee. He is the Director of Shenzhen Carbon Storage Cement-based Materials Engineering Laboratory, Expert of Shenzhen Construction Industrialization Association, Nanshan District, Shenzhen pilot talent, reviewers of international publications.

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