

Optimization Design of Cable Ends Based on Size Optimization & Topological Optimization

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Abstract

Large span spatial structures have developed rapidly in recent years in China due to the superior spanning ability of flexible cables. Galvan-coated cables are widely used in structure which was developed successfully with nice corrosion resistance in the last century. Locked cables are beginning to be used in construction with much better corrosion resistance as the production technology are innovated.

Lack of design theory, a few manufacturers have fixed specifications, but the end cup matched with the cable and the adjusting part connected with the joint have larger safety reservation for both Galvan-coated cables and locked cables. Cable end is very bulky and wastes more material especially with large diameter.

This paper used size optimization to get light ends of the existing cables, then based on optimization methods commonly used on the continuum and aimed for minimum quality, used topology optimization to get much lighter ends. Finally, the optimized end was simulated by finite element method. It shows that the optimized end is lighter and better in performance, which can reduce the production cost and promote the reform of the cable manufacturing industry.

Keywords: large span; spatial structure; cable; size optimization; topology optimization



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