Statistical Analysis of Cables in Long-Span Cable-Stayed Bridges

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Abstract : With the rapid development of transportation, there are more than 100 cable-stayed bridges with main span larger than 300 m in China. In order to ascertain the statistical relationships among the design parameters of stay cables and their distribution characteristics, 1500 cables were selected from 25 practical long-span cable-stayed bridges. A new relationship between the first order frequency and the length of cable was found by conducting the curve fitting. Then, based on this relationship other interesting relationships were deduced. Several probability density functions (PDFs) were used to investigate the distributions of the parameters of first order frequency, stress level and the Irvine parameter. It was found that these parameters obey the Lognormal distribution, the Weibull distribution and the generalized Pareto distribution, respectively. Scatter diagrams of the three parameters were plotted and their 95% confidence intervals were also investigated.

Keywords : cable, cable-stayed bridge, long-span, statistical analysis

Conference Title : ICBMSM 2014 : International Conference on Bridge Maintenance, Safety and Management

Conference Location : London, United Kingdom

Conference Dates : November 28-29, 2014