frequency, which is different from AS24's modes. Fig.19(b) and Fig. 20(b) show that different modes of vibration cluster are in different regions of wind speed and direction. Therefore, the frequency difference may contribute to the discrepancy. Second, the simulation of Scruton number of the 200mm-diameter cable was not followed, which was one eleventh of stay AS24. The cable may vibrate at lower wind speed with the reduced Scruton number.

From Zuo's field measurements and our experimental results, it is clear that rain-wind-induced vibration and large amplitude dry cable vibration share many characteristics on spatial state, the occurrence conditions and vibration responses for a 200mm-diameter cable. It can be suspected that the rain-wind-induced vibration may in fact be due to a mechanism that inherently exists for inclined and/or yawed cables regardless of the presence of rainfall, and that the role of the rainfall is to promote or stabilize this mechanism(or both) at lower reduced velocity. Due to our assumption in chapter 4, the large-amplitude vibrations, with or without rainfall, might be due to a type of vortex shedding that is different from the classical Karman vortex shedding.

## 6. CONCLUSIONS

This work used the high precision raining simulator and re-produced the rain-wind induced vibrations of cables of two different diameters in wind tunnel. The effectiveness of spiraled wires countermeasure were also investigated. From the test results, cables can vibrate under different environmental conditions. The maximum amplitude of rain wind induced vibration occurs in a different wind speed and rainfall intensity combination when their diameter of cables varies. The experimental results are compared with Zou's field measurements for verification. The 139mm-diameter cable is likely to vibrate with high wind speed and low rainfall intensity, while the 200mm-diameter cable's vibration occurs at wind speed 2m/s regardless of rain.

It can be concluded that the mechanism of these two vibrations are not exactly the same. Different theories can be used to explain the vibrations of the two cables. The mechanism of the 139mm-diameter cable vibration at high wind speed may be explained as a type of galloping. The vibration of the 200mm-diameter cable is more related to vortex-induced vibration, because it can vibrate regularly without rain, which may result from the influence of the axial flow. However, the details are not clarified. More work is needed for further understanding of the mechanism of the cables.

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