

instability different is very small in these two kinds of load conditions. During the procession of the wind velocity increasing and to the main girder buckling, the torsion angle, transverse displacement and vertical displacement under the action of static crowd load and dynamic crowd load, whose curve slope are similar and changes smoothly. Compared with the critical instability wind speed without wind cable, under the action of dynamic crowd load is increase.

As the mention above, within the additional wind-resistant cable the bridge's overall stiffness is increased, whether static or dynamic crowd load, and the critical wind speed is improved. However, the critical wind velocity and displacement are small under the action of dynamic crowd load and static crowd load, which is because the additional wind-resistant cable which increasing the structure stiffness, reducing the crowd of dynamic effect and shortening the gap between the dynamic load and the static load.

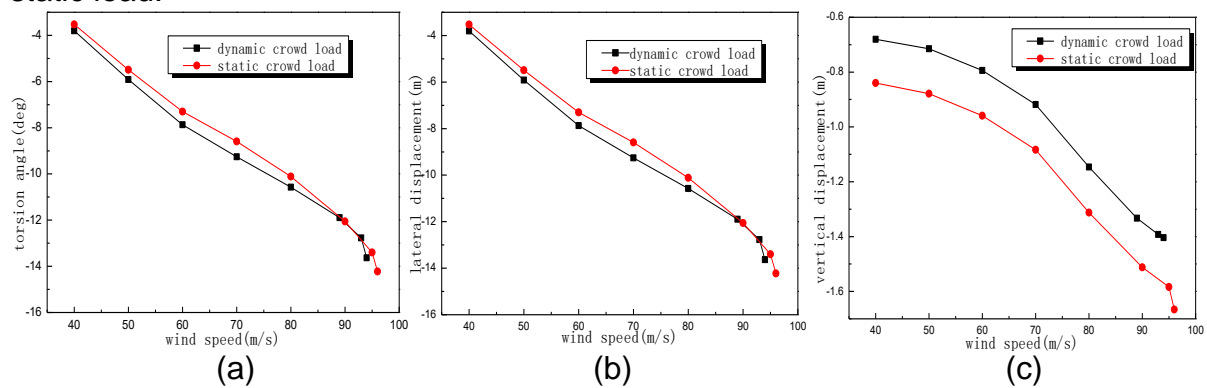


Fig.14 Aerostatic response of beam with different wind speed in different crowd load

Fig.15 represent the torsion deflection, horizontal displacement and vertical displacement of bridge axis on each section of the pedestrian suspension bridge, which with the wind-resistant cable under the action of static crowd load and dynamic crowd load, when the main girder under 65 m/s wind velocity. Can be seen from the diagram, the value of bridge axis angle and displacement of each point on bridge axis is very small under the same wind speed, and rules of the curve are similar under the action of static crowd load and dynamic crowd load. At this point, the nature of the static crowd load and dynamic crowd load is near.

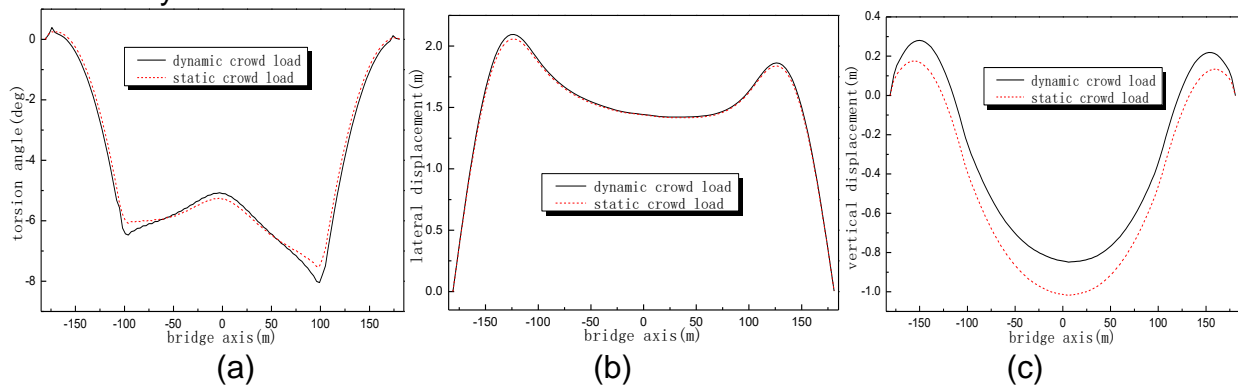


Fig.15 Aerostatic response of beam with 65m/s wind speed under different crowd load

6. Conclusions

Three-dimensional nonlinear aerostatic stability analysis of pedestrian suspension bridge is carried out in this paper, and the aerostatic stability is discussed in different crowd load conditions and wind resistance (wind-resistant cable) measures. Meanwhile, this paper explores the effect of buckling critical wind velocity of the main girder when the vertical dynamic crowd load on the bridge, at the same time, the deformation values on the bridge axis and the main girder torsion angle and the largest displacement of pedestrian suspension bridge are calculated under the different velocity. The results show that:

1. The overall stiffness of the bridge would be enhanced if the whole bridge is full of crowd load or the transverse half is full of crowd load, so as to improve the pedestrian suspension bridge girder's buckling critical wind velocity. Deformation of the bridge is adversely affected when the longitudinal half is full of crowd load, this situation should be avoided.

2. The wind resistant cable can reinforce the main beam and improve the overall stiffness of the bridge, and also increase the critical wind velocity. Moreover, transverse displacement of the main girder is effectively restricted.

3. The vertical dynamic crowd load causes the vibration of main girder and the deformation of main girder. What's more, the buckling instability wind girder is reduced. However, with the additional wind-resistant cable, the structure stiffness is improved, the dynamic crowd load effect is weakened and the character of the bridge is approach to under the effect of static crowd load.

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