

Wind tunnel study of wind-induced interference effects among multiple domes

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Abstract

Dome is a common form widely used in large-span spatial structures. Multiple identical domes are often arranged as a group when used as coal storage bunkers, nuclear power plants or other practical projects. Wind-induced interference effects among multiple domes have not been investigated in depth compared to other researches in the field of wind engineering. In this paper, wind tunnel test is conducted to research the influences of wind-induced interference effects on the wind load characteristics and surface wind pressure distribution of the dome groups with different arrangements. The main research contents are shown as below:

1. The wind-induced interference effects of the dome groups with different arrangement shapes including straight line, equilateral triangle and square shapes, as shown in Figure 1.



Figure 1: Dome groups with different arrangements shapes.

2. The wind-induced interference effects of the dome groups at different arrangement spacing. For each arrangement above, consider the influence of the distance between adjacent domes. (e.g. $L=0, R/2, R$)

3. The wind-induced interference effects of the dome groups under different wind directions. The test conditions with different wind directions rotating from 0 to 180° are set for each arrangement.

Through the above wind tunnel tests, the wind load characteristics and surface wind pressure distribution of the dome groups can be obtained, and the influences of wind-induced interference effects among multiple domes can be investigated in depth. This work provides a reference for the further structural design and research of such dome group.

References

- [1] A.C. Khanduri, *Wind-induced interference effects on buildings: integrating experimental and computerized approaches*, Concordia University, 1997.
- [2] A.C. Khanduri, T. Stathopoulos, and C. Bédard, “Wind-induced interference effects on buildings - a review of the state-of-the-art”, *Engineering Structures*, vol. 20-7, pp. 617-630, 1998.
- [3] WH. Yan, CJ. Wang, DH. Wu, and Z. Huang, “Research on wind-induced interference effects infolding camping tent groups”, *Engineering Mechanics*, vol. 33-4, pp. 166-175, Apr. 2016.