

Rain-wind induced vibration of vertical hanger cables

Rain-wind vibrations of bridge cables

During erection of the Canakkale suspension bridge it was observed that the vertical hangers carrying the bridge deck were set into large amplitude vibrations in weather combining rain and wind. Climatic wind tunnel tests were carried out to estimate the amount of damping needed to stop the vibrations. Visual observations made during the tests revealed that the physical mechanism exciting the vibrations is likely different from the water rivulet mechanism responsible for large amplitude rain-wind vibrations of inclined cables in cable-stayed bridges which has been the subject of intense research for the past 3 decades. Thus, the design guidelines available for rain-wind vibration of inclined stay-cables are not readily applicable to vertical hanger cables.

Research objectives and questions

The objective of the project is to identify the physical mechanism responsible for the excitation of rain-wind wind vibrations of vertical hanger cables and obtain answers to the following questions:

- What governs the frequency of vibration?
- What governs the amplitudes of vibration?
- What is the effect of mechanical damping on the vibration amplitudes?

The end goal being the increase of the safety, user comfort and resilience of large infrastructure projects.

Research method

The project is carried out partly as a theoretical study to be performed by COWI and partly as physical experiments carried out in the climatic wind tunnel at FORCE.