IOWA STATE UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING

Wind tunnel experiment and CFD for the prediction of bridge corrosion caused by airborne sea salt

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Abstract:
Recently, in Japan, the importance of maintenance to infrastructures has been increasing. In bridge maintenance, it is important to prevent its corrosion. Especially, airborne sea salt causes corrosion of bridges located in coastal area. Therefore, on-site measurement of the amount of airborne sea salt has been conducted. In Japan, there are two methods which are widely used in order to measure the amount of airborne sea salt. One is the Doken (Public Works Research Institute) tank method, the other is the dry gauze method (JIS-Z2382). The Doken tank method uses the special sampler tank called "Doken tank" to capture the airborne sea salt. The dry gauze method exposes a dry gauze-patch near a bridge surface. However, from only the results, it is difficult to reveal the advection diffusion behavior of airborne sea salt around a bridge girder.
In the present study, we developed the experimental and computational methods to predict the advection diffusion behavior of airborne sea salt around a bridge girder. The experimental method is based on the flow visualization of a wind tunnel experiment. Its concept is that the information of airborne sea salt behavior is evaluated from the behavior of smoke used in the flow visualization. In order to capture the behavior of smoke from the flow visualization, we used an image processing technique. The computational method is based on Eulerian method in CFD. By using the k-e turbulence model, we evaluated the turbulent diffusivity of the smoke in comparison with our experimental result. The computational method reveals the advection diffusion behavior of airborne sea salt in detail. These methods enable to evaluate the behavior of airborne sea salt and predict the bridge corrosion.

Biography:
Dr. Hiroshi Hasebe is an Assistant Professor of Department of Civil Engineering, College of Science and Technology at Nihon University. His work focuses on wind engineering problems, such as wind-resistant bridge design, wind environment of urban areas. He received B.E. (2001), M.E (2003) and Dr. Eng. (2010) in Civil Engineering from Nihon University. He got an Incentive Award (2010) from Japan Association for Wind Engineering. He was a visiting professor at the Institute for Computational Engineering and Sciences (ICES) in fall 2012.

This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students.