# Field Observation of an Ultrahigh Voltage Steel Transmission Tower under Wind and Seismic Action

Yusuke Sato, Tomomi Ishikawa and Daisuke Takabatake
Central Research Institute of Electric Power Industry, Chiba, Japan

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## Abstract

CRIEPI (Central Research Institute of Electric Power Industry) has launched a field observation system on an ultrahigh voltage steel transmission tower with about 140m in height to study the soundness of aged steel transmission tower under a natural environment, for example wind and earthquake. The presentation discusses an outline of the observation system and preliminary analysis of the observed data.

To investigate wind and earthquake resistance, cable oscillation resulting from galloping , and redundant members vibration in breezes, various instruments were deployed for wind velocities, wind directions, temperatures, humidity, air pressures, accelerations, axial forces, deflection angles of cables and cable tension forces. Statistics like averages, peak values, and standard deviations the time histories were calculated every 10 minutes throughout a set of observation data. Additionally, three remote industrial televisions were installed to record the galloping-induced cable oscillations and the redundant members vibrations.

The observation has initiated since December 1, 2010. Measured data in four months were analyzed up to date. A maximum mean wind velocity and a maximum peak gust on the tower top were 32.2 m/s and 37.8 m/s, respectively. A predominant wind direction on the tower top was west. The nature of relatively strong wind effect can be examined because the mean wind velocities with more than 30 m/s were measured many times. In addition, standard deviations of axial forces of the tower members exponentially increase with respect to the mean wind velocity. Furthermore, the threshold condition on the redundant member vibration was examined focusing on the wind direction and the mean wind velocity. As a result, this vibration was identified as Karman vortex excitation.