

WIND TUNNEL EXPERIMENTS ON VISIBLE PLUME FROM A COOLING TOWER**T. Michioka, A. Sato, T. Kanzaki, K. Sada***Komae Research Laboratory, Central Research Institute of Electric Power Industry, Tokyo, Japan*

The heated moist air emitted from a wet cooling tower forms visible plumes in the atmosphere. Since it causes environmental problems such as landscape, poor visibility, and so on, the visible plume region must be accurately estimated. A wind tunnel experiment is thought to be one of the predominant methods, but no one has developed an accurate method to predict the visible plume region. Therefore, we developed a new wind tunnel experimental method for predicting the visible plume region from a mechanical-draft cooling tower. The diffusions of water vapor and temperature (potential temperature) emitted from the cooling tower in the wind tunnel are tracked using a tracer gas. The concentration fluctuation of the tracer gas is measured using high-response flame ionization detectors. The moist plume-induced fog is generated whenever the instantaneous water vapor mixing ratio estimated using the tracer gas at measurement points is larger than the saturation water vapor mixing ratio. Furthermore, since the instantaneous fog is retained for a finite period, it is assumed that the instantaneous fogging region is included in the visible plume region. To estimate the accuracy of the present method, the visible plume region in the wind tunnel experiment is compared with the observations of the mechanical-draft cooling tower at the Benning Road plant. The results show that the visible plume length and height are in good agreement with the observations, and that the present wind tunnel method can well describe the visible plume region from the cooling tower.