Investigation of a Simple Estimation for Snow Accretion on overhead power lines

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It is important for engineers in electric power companies to get accurate estimation or prediction of snow accretion on overhead power lines for preventing variety of accidents in case of heavy snowfall. The classification of precipitation (i.e., rain, dry, wet snow, and slush) is one of important factors for accurate estimation and prediction. In this study, long-term surface observations, provided from Japan Meteorological Agency, are examined to develop classification method. Temperature and humidity data are main parameters in our method, and the method is validated using datasets obtained in our special observation sites in Japan.

At the above sites, wind-snow loads of power lines are observed together with meteorological elements such as temperature, wind, humidity, pressure, and precipitation. A simple model for computing snow accretion is developed, and a combined method of accretion model with the classification method is applied to observation and verified. In this simple model, a volume of snow that stricks power line is estimated using precipitation, wind speed normal to conductor. Collision efficiency is assumed to be 1. An empirical equation is used for snow density. Sticking efficiency according to a type of precipitation is parameterized using temperature and wind velocity. Such a parameterization is based on the analysis of artificial wind-tunnel experiments.