

Estimation of outdoor mean radiant temperature by field experiment and modelling for human-biometeorology use

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The mean radiant temperature (T_{mrt}) is an important factor for the evaluation outdoor human thermal comfort. Although the six-direction short- and long-wave radiation method is regarded as the most accurate way to measure T_{mrt} , it is not popularly applied in urban research due to the complexity and costly for the instrumentation. Therefore, this research apply a standard 150mm diameter black globe thermometers for the T_{mrt} measurement based on the prediction function by ISO-7726. The six-direction radiation method is also proceed simultaneously. The comparative results indicate that the T_{mrt} measured by the globe thermometers fit those measured by the six-direction radiation system well while in clear sky day and calm wind speed. Due to the ISO-7726 function may overestimated the heat convection when instantaneous wind speed is high (approx. over 5 m/s) whereas the heat balance of the globe is not act so fast, T_{mrt} measured by the globe thermometers is consequently over-estimated. Analytical results indicate these over-estimated errors can be solved when the current wind speed in the function is imported by is averaged data for previous 10 minutes. The result is helpful for an easy and portable measurement for the application of human-biometeorology in urban area.