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Parametric study on the cooling effects from dry mists in a controlled environment

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**Parametric study on the cooling effects from Dry Mists in a controlled environment**Kai Zheng<sup>a,\*</sup>, Masayuki Ichinose<sup>b</sup>, Nyuk Hien Wong<sup>a</sup><sup>a</sup> National University of Singapore<sup>b</sup> Tokyo Metropolitan University

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**Abstract**

Dry mist systems have been adopted for thermal comfort usage for some years in a temperate country like Japan. This paper seeks to study the different variables that can optimize the cooling impact from such systems. A double-flow pneumatics spray nozzle with the same pressure for air and water is used, and the experiments are conducted in a climatic chamber. Different values for wet bulb depression, pressure and water temperature are analysed, and parametric studies are conducted. The results show that wet bulb depression is a good indicator for determining operating conditions of the dry mist system, while the pressure can be varied to achieve optimal cooling at various heights on a fixed distance downstream. Changing the pressure in this study, however, had relatively small impacts on cooling due to the small change in mass flow rate. Water temperature was shown to have negligible results on cooling the air temperature at 2 meters downstream, despite the variation of 10°C.

Keywords: dry mist, evaporative cooling, urban heat island, parametric study, pneumatic nozzle

**1. Introduction**

The Urban Heat Island (UHI) effect refers to higher temperatures in built up urban areas than the surrounding rural areas. This increasing temperature has led to the need of new and advanced counter measures to combat this UHI effect. Thus far, air conditioning has been one

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