SPECTRAL TRANSMITTANCE MEASUREMENT OF WATER MIST FROM DUAL FLUID NOZZLE IN INFRARED REGION

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In recent years, large fires have become a serious problem due to environmental changes caused by global warming. The main cause of fires increasing in size and duration is thermal radiation. Thermal radiation causes burns to evacuees and the spread of fire. Currently, sprinklers are widely used as a fire suppression system. This is a very effective system for initial fire suppression. However, conventional fire extinguishing systems, including sprinklers, emphasize fire extinguishing performance and do not take into account the shielding of thermal radiation, which causes fires to grow larger and last longer. Therefore, it is desirable to realize a fire extinguishing system with a thermal radiation shielding function. We focused on water mist, which has the function of shielding thermal radiation from a fire, and measured the radiation shielding ratio of the mist layer with a power meter [1]. However, the relationship between the water droplet particle size and the transmittance spectrum of the mist layer has not been confirmed. The effect of water droplet particle size on the transmittance spectrum needs to be evaluated because the spectral characteristics of a fire change with time in an actual fire. In this study, the spectral transmittance of the water mist was measured in the infrared region.
The spectral transmittance of the mist was measured under conditions of equal light path volume, and the results are shown in Figure 1. Nozzle A shows the same shielding performance as Nozzle B, despite the smaller volume of water.

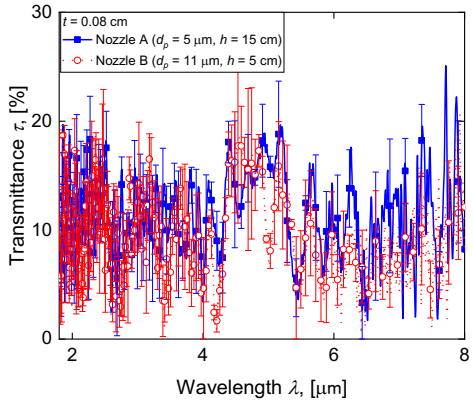

Figure 1. Comparison of the transmittance of the mist layer from different nozzles in the same optical path volume.

[1] H. Gonome, T. Nagao, Y. Takagi, Mi. Ono, T. Kogawa, S. Moriya, J. Okajima, "Protection from thermal radiation of hazardous fires: Optimizing microscale droplet size in mist barriers using radiative transfer analysis", *Process Saf Environ Prot*, Vol. 143, pp. 114-120, 2020.

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