STUDY ON A SOLID FRACTION MEASUREMENT METHODOLOGY OF PARAFFIN EMULSION USING LIGHT

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ABSTRACT. Non-contact measurement method of solidification rate for the paraffin emulsion slurry that is a latent heat storage material has proposed. This method utilizes the correlation of transmissive and reflective light intensity and solidification rate of paraffin when the light is irradiated. In order to clarify this a method to predict the optical properties of the whole medium that disperses particles with different optical properties and different shapes was developed. This method was used to numerically study the phenomenon in which the transmissive light intensity and reflective light intensity changed according to the phase change of the paraffin in the emulsion. As a result, it was found that changes in the paraffin particle surface conditions that resulted from the solid/liquid phase change had the greatest affect in this phenomenon. Based on this knowledge and experimental inspection of slurry using microscopes, a light scattering model considering with the craters created in the interface between water and paraffin during solidifying of paraffin particles was constructed. As a result of the numerical analysis by this model and a comparison of the experimental results, we reached the conclusion that the decrease in transmissive light intensity and increase in reflective light intensity of the emulsion slurry caused by the increase in the solidification rate of the paraffin particles was due to the increase in backward scattering caused by these craters.

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