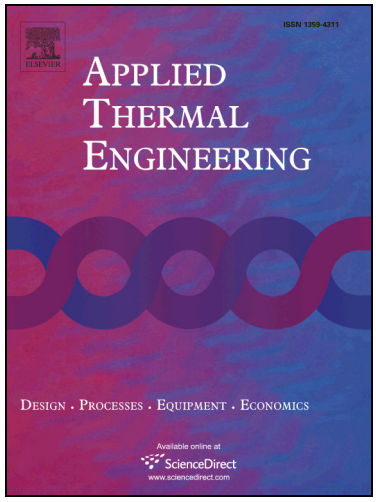

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Experimental study of convective heat transfer coefficients of CO_2 hydrate slurries in a secondary refrigeration loop

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ABSTRACT

Conventional refrigerant fluids can be harmful to the environment due to their strong GWP. One of the solutions to reduce their impact could be the use of secondary refrigerant fluids, such as hydrate slurry in refrigeration devices. Gas hydrates are solid structures able to trap gas molecules and have a high dissociation enthalpy so that they can store and transport huge quantities of cold energy. The aim of the present work is to determine the thermal behavior of CO_2 hydrate slurry based on a heating tube method. A secondary refrigeration loop composed of a tank in which the slurry is formed by subcooling and a loop with a heating tube has been used to determine convective heat transfer coefficients. The results have been obtained for CO_2 hydrate slurries with solid fractions between 0 and 14 vol.%. In this range of solid fractions, convective heat transfer coefficients of hydrate slurries are nearly 2.5 times greater than that of liquid water.

Keywords: hydrates; CO_2; slurry; heat transfer coefficient; heating tube; secondary refrigeration.

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