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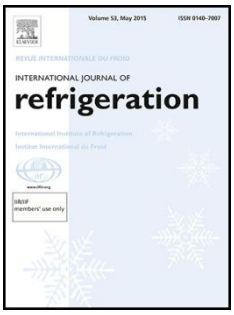

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Rheology of Ethylene- and Propylene-Glycol Ice Slurries: experiments and ANN model

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Highlights

- Ethylene and propylene-glycol ice slurries with ice fractions up to 65%
- Experimental rheograms obtained using an advanced HR2 rheometer
- Use of the Herschel-Bulkley model to fit the measurements
- Correlations for the flow and consistency indexes as a function of the ice fraction
- Development and validation of an Artificial Neural Network model

Abstract

An experimental investigation combined to a numerical study is performed to characterize the rheological behavior of ice slurries. Two additives, namely ethylene glycol and propylene glycol, are considered at three initial concentrations X_a=5, 14 and 24%. The ice fraction is varied from 5 to 65%. Flow ramp tests are carried out using a hybrid HR-2 rheometer. The Herschel-Bulkley model is then employed to predict the rheological behavior of ice. Using a least-square approach, the flow index *n* and the consistency index *k* are deduced from the rheograms. The ice slurries exhibit either a shear-thinning or a shear-thickening behavior depending on the operating conditions. An experimental database is produced based on the present experiments