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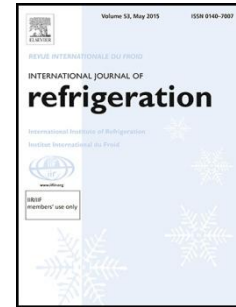
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Generalized effects of faults on normalized performance variables of air conditioners and heat pumps

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Highlights

- Relationships for effects of faults on vapor compression systems are provided
- Faults: Heat exchangers, liquid line, compressor leakage, and non-condensable gas
- Effects are generalized from the results of several previous experiments
- These non-dimensional models can be used as broad predictors in many applications

ABSTRACT:

The effects of several types of faults on air conditioners and heat pumps have been studied in many laboratory experiments. All available data have been gathered, and the independent variable (fault intensity) and each of the dependent variables (fault impacts) normalized to show the trends in a generalized fashion. Relationships are provided wherever there are sufficient results. Most of the significant fault types are included (except refrigerant charge variation, which was discussed in Mehrabi and Yuill (2017)): condenser heat transfer (CA), evaporator heat transfer (EA), liquid line restriction (LL), compressor leakage (VL), and non-condensables in the refrigerant (NC). Relationships are presented separately for fixed orifice and thermostatic expansion valve equipped systems. The variation level in the results indicates that in many cases, the generalized relationships provide reasonable predictors of fault effects on systems for which laboratory test results are unavailable. These relationships provide the first generalized fault effect models for air-conditioners and heat pumps.

Nomenclature:

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