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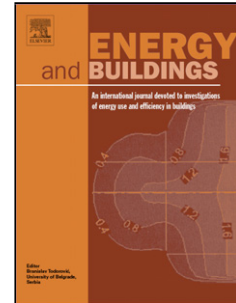
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# Parametric modelling of domestic air-source heat pumps

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## Highlights

- Parametric heat pump model reported based on a new 4-parameter compressor model
- The model can be parameterised using field data or manufacturer's data
- The model is evaluated using both field trial data and laboratory test data
- Results confirm recent extensive field trials of heat pumps in service

## ABSTRACT

A new domestic air-source heat pump model is proposed which can be parameterised either from field data, experimental data or manufacturers' standard rating data. The model differs from the much more prevalent system-side regression models for these types of heat pumps in that it operates on refrigerant-side variables. This makes it more suited to detailed performance analyses of heat pumps in service. Because both field data and manufacturers' data can be used for parameterising the model, it can be used to investigate problems associated with the building performance gap where a heat pump is used. A new type of efficiency-based compressor model is developed which enables compressor performance to be directly compared with alternatives and a model of defrosting is included by introducing a new defrost discounting term. Results tested using data from a field monitoring site and from a laboratory installation show good predictive behaviour by the model especially at low source air temperatures. When the model is fitted using manufacturer's standard rating data, a performance gap is evident when compared with the model fitted to field data but the gap is generally nominal.

*Keywords:* Air-source heat pump; heat pump modelling; compressor modelling; defrosting; performance gap

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