# COMPARED PERFORMANCE OF REFRIGERATION SYSTEMS USING OZONE-FRIENDLY REFRIGERANTS

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## ABSTRACT

*A vapor compression simulation model was developed. Simple mathematical models were employed for each component of the cycle. They resulted in a set of nonlinear equations, which was solved numerically. The model is capable of predicting the operating point of the system (including condensing and evaporating pressures) as a function of equipment characteristics (for example, compressor swept volume, speed and clearance ratio, and heat exchanger overall conductances) and prevailing thermodynamic conditions (such as heat source and heat sink temperatures with the mass flow rates of their fluids). As an application, a comparative analysis is made on the thermodynamic performance of a domestic refrigeration system running on three different refrigerants: HCFC-22, R-410A and R-407C.*

## REFERENCES

1. **Klein, S.A. and Alvarado, F.L.** 2004. *Engineering Equation Solver, F-Chart Software, Commercial Version 7.184.*
2. **T. B. Herbas, E. C. Berlinck, C. A. T. Uriu, R. P. Marques and j. A. R. Parise** - *'Steady-state simulation of vapour-compression heat pumps', International journal of energy research, vol. 17, 801-816* (1993)
4. **Bansal, P, K., Dutto, T. and Hivet, B. (1992).** '*Performance evaluation of environmentally benign refrigerants in heat pumps. 1: A simulation study'*, International Journal of Refrigeration, 15:6, 340-348.
6. **Beermann, K. and Kruse, H. (1992).** *'Experiences with the refrigerant R-134a as a "drop-in" replacement in a large water-water heat pump*', Proceedings of the 1992 International Refrigeration Conference - Energy Efficiency and New Refrigerants, 14-17 July 1992, Purdue University, West Lafayette, Indiana, Vol. I, pp. 211-219.
7. **Blundell, C. J.** (1977). *'Optimising heat exchangers for air-to-air space heating heat pumps in the United Kingdom',* International Journal of Energy Research, 1, 69-94.
8. **Bong, T. Y., Hawlader, M. N. A. and Mahmood, W** (1988). *'Influence of expansion device on the performance of an air-conditioner with a desuperheater',* ASHRAE Transactions, 94, part 2, 661-672.
10. **Cecchini, C. and Marchal, D.** (1992). *'A simulation model of refrigerating and air-conditioning equipment based on experimental data*', ASHRAE Transactions, 97, part 2, 388-393.
16. **Domanski P. and Didion, D.** (1983). *'Computer modelling of the vapour compression cycle with constant flow area expansion device',* NBS Building Science Series 155, National Institute of Standards and Technology, Gaithersburg, MD.
20. **Downing, R. C.** (1974). *'Refrigerant equations',* ASHR.AE Transactions, 80, part 2, 158-169.
36. **Martins Costa, M. L. and Parise, J. A. R.** (1993). *'A three-zone simulation model for air-cooled condensers*', Journal of Heat Recovery Systems A CHP vol 13, No. 2, pp. 97-113