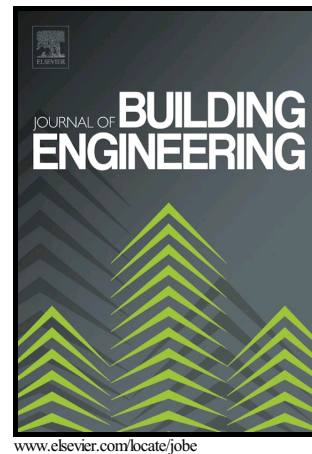


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Promoting Variable Refrigerant Flow System with A Simple Design and Analysis Tool

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Abstract

Variable refrigerant flow (VRF) or variable refrigerant volume (VRV) air-conditioning systems provide some appealing benefits over conventional air conditioning systems. This paper provides a quick overview on VRF technologies and a brief analysis on technical barriers to their wide spread adoption in the North America. One of the major challenges was found to be lack of fast modeling tool that can be used at very early stage of building design for system decision. This paper discusses the current simulation and design tools for sizing VRF systems and predicting energy benefits of VRF systems, paying particular interest to which can be used during the earliest stages of the design process. The paper introduces the development of a new program that can quickly size a VRF system and estimate the energy consumption of the system relative to a traditional variable air volume (VAV) system without requiring detailed building data. The tool is validated both experimentally and numerically using published experimental and simulation results. Finally, this tool is compared qualitatively to four currently available VRF design and analysis tools that require more intensive inputs and are often used for system design at design development stage. This research, the tool development and validation cases suggest that VRF systems have the potential to save energy. It is clear however, that the percentage of savings depends on the climate and local energy costs.

Keywords: variable refrigerant flow, simulation tool, system design, energy consumption

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