

Modeling Heat Pump Recharge of a Personal Conditioning System with Latent Heat Storage

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Abstract

Roving Comforter provides personal cooling in the range of 150 W using vapor compression cycle (VCC) up to 4 hours. During this operation, the condenser heat is stored in a latent heat storage made of phase change material (PCM). This heat needs to be discharged before next cooling operation. A heat pump mode is considered and analyzed for this heat discharge in the present article. The cycle is modeled using CEEEModelicaLibrary, which is a commercial package for complex vapor compression systems. Equations and assumptions involved in modeling some of the components is presented. Programming and modeling decisions for PCM modeling are discussed in detail. A parametric study is conducted with the heat pump system model to identify merits and demerits of operating heat pump cycle at various compressor RPM's.