Performance Enhancements for Zero-Flow Simulation of Vapor Compression Cycles

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Models that correctly describe the dynamic behavior of vapor compression cycle at low or zero refrigerant mass flow rates are valuable because they can be used to handle low load, on/off cycling and inactive component conditions. However, low- or zero-flow simulation imposes significant computational challenges because of high frequency oscillations in mass flow. We explore techniques that may be used for improving robustness and performance of low- or zero-flow simulation. Comparisons are conducted to demonstrate the efficacy of the proposed techniques. It is shown that these techniques can result in simulations that are more robust and significantly faster than real-time.

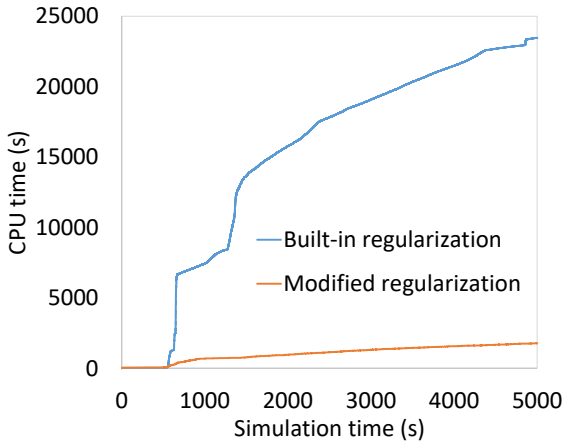

Figure 1. CPU time vs. simulation time with different types of regularization

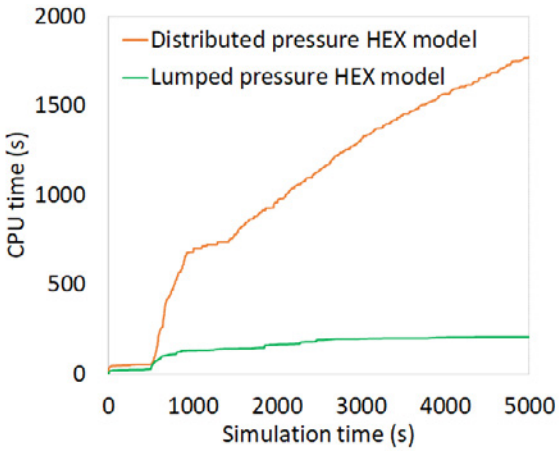

Figure 2. CPU time vs. simulation time with different heat exchanger models