Field Performance of State-of-the-Art HVAC Systems

Abstract: Real-world performance of heating and air conditioning systems often deviates substantially from what might be predicted by simulations, laboratory experiments, or equipment ratings. When the ASHRAE headquarters building in Atlanta, Georgia was renovated in 2008, two separate heat pump systems were installed and instrumented: – a variable refrigerant flow (VRF) air-to-air heat pump system serving the first floor and a water-to-air ground source heat pump (GSHP) system, primarily serving the second floor. In the other hemisphere, the Studenthuser building at the University of Stockholm is also served by a water-to-water GSHP system with a very different design from the ASHRAE headquarters GSHP system. All three systems perform counterintuitively, if one’s intuition is based primarily on thermodynamic theory. Deviations from expected performance, reasons for the counterintuitive performance, and the broader implications will be discussed in the presentation.

Biography: Jeffrey D. Spitler is Regents Professor of mechanical engineering at Oklahoma State University where he holds the OG&E Energy Technology Chair. He is a past president and Fellow of the International Building Performance Simulation Association, and a Fellow of ASHRAE. He has authored or co-authored over 150 technical publications including seven books. In the 2014-2015 academic year, he served as the Fulbright Distinguished Chair of Alternative Energy Technology at Chalmers University of Technology in Gothenburg, Sweden, where he worked on methods for predicting borehole thermal resistance and other ground-source heat pump system research.