Master's Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
University of Texas at Arlington

Sensitivity Study of Different Components in Calibrated Data Center Model

By

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Microsoft Teams Link

Abstract

Data center (DC) consists of different components like cooling pipes, data cables, power conduits, etc. To analyze the thermal behavior of DC using computational fluid dynamics, virtual model of DC is required. To build this virtual model, data is required regarding the different components like size, location and defining parameters. Site surveys are required to collect this data. Data collection is important to build an accurate model. There is lack of guidance with respect to which components are crucial to achieve level of accuracy in computational model. Sensitivity study can be used to determine accuracy achieved by introducing simplification in component parameters.

Two calibrated raised floor data center models are used to study sensitivity of DC components. Components were selected based on time and effort required to measure the parameter to define them, quantity of the component and educated prediction about effect of the component on output of interest. A total of 14 DC components are considered for sensitivity study and modifications were made in the individual components and simulations were run for each component. The full range of input parameter values for parameterized component object is considered, and simulations are performed. First, the effect of the modifications was studied on the data center tiles, further how these changes in tile flow rate affect the IT parameters and Air-Cooling unit (ACU) supply and return air temperatures was observed. These results are compared with the baseline calibrated model to understand the trade-off between survey effort/cost and model accuracy.