



South Westphalia University of Applied Sciences, Campus Soest

Local and Global Sensitivity Analysis to Simplify a Residential Building Model - Dynamic Simulations with Modelica

-Master Thesis-

By

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Abstract

The focus on energy consumption related to the building sector has been growing since the past decade. Sensitivity analysis plays a significant role in building energy analysis. It helps to identify the key parameters that have a large impact on the building thermal performance. It can also be a tool to understand the characteristics of the model and simplify in its development stage. The purpose of this research is to investigate the key influential and non-influential parameters to simplify a residential building model for quarter simulations. The non-influential parameters can be omitted and the influential parameters can be optimized to develop an energy efficient residential building. In this thesis, both local and global sensitivity analysis has been used to identify the influential and non-influential parameters for a multi-zone one family dwelling. There are ten major parameters that were associated with the building. For the simulation, five parameters were selected to understand their influence on the total energy demand. A comparison of the one family dwelling was also performed with a reference one family dwelling from project 100 CHP units in Bottrop to investigate the trend of the thermal characteristics. It was found that both sensitivity analysis method provides a similar ranking of the influential and non-influential parameters. This study can give answers to the question regarding the investigation of the influential parameters which can be optimized to simplify a residential building model. Further studies are needed to develop a calibrated single zone one family dwelling with fewer parameters, which will help to decrease the simulation run and cost for the quarter simulation.

Keywords: sensitivity analysis, local sensitivity analysis, global sensitivity analysis, energy demand, validation, functional mock-up unit, one family dwelling, multi-family dwelling, modelica standard library