

## Uncertainty Analysis of a Hardware in Loop Setup for Testing Products Related to Building Technology

**Authors :** Balasundaram Prasaant, Ploix Stephane, Delinchant Benoit, Muresan Cristian

**Abstract :** Hardware in Loop (HIL) testing is done to test and validate a particular product especially in building technology. When it comes to building technology, it is more important to test the products for their efficiency. The test rig in the HIL simulator may contribute to some uncertainties on measured efficiency. The uncertainties include physical uncertainties and scenario-based uncertainties. In this paper, a simple uncertainty analysis framework for an HIL setup is shown considering only the physical uncertainties. The entire modeling of the HIL setup is done in Dymola. The uncertain sources are considered based on available knowledge of the components and also on expert knowledge. For the propagation of uncertainty, Monte Carlo Simulation is used since it is the most reliable and easy to use. In this article it is shown how an HIL setup can be modeled and how uncertainty propagation can be performed on it. Such an approach is not common in building energy analysis.

**Keywords :** energy in buildings, hardware in loop testing, modelica modelling, Monte Carlo simulation, uncertainty propagation

**Conference Title :** ICBTM 2020 : International Conference on Building Technologies and Materials

**Conference Location :** Rome, Italy

**Conference Dates :** October 15-16, 2020