

HARDWARE-IN-THE-LOOP SIMULATION FOR HOME ENERGY SYSTEMS

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ABSTRACT

Homes, as the future melting pot of different forms of energy, are one of the key enablers for the smart grid technology. The interface of different energy domains is the main impulse for innovation and development of new technologies. In this work a multi-physics test bed will be introduced which supports the testing of renewable energy systems in the context of home energy systems (HES). The test bed, based on Hardware-in-the-Loop (HiL) technology, provides a platform to test the real hardware and controllers under the complex, simulated boundary conditions (Figure 1), which closes the gap between simulations or field studies with dynamic boundary conditions and typical lab experiments with static boundary conditions. Based on HiL principle the Power-HiL approach for HES is derived, which allows for the testing of domestic energy systems in a holistic way.

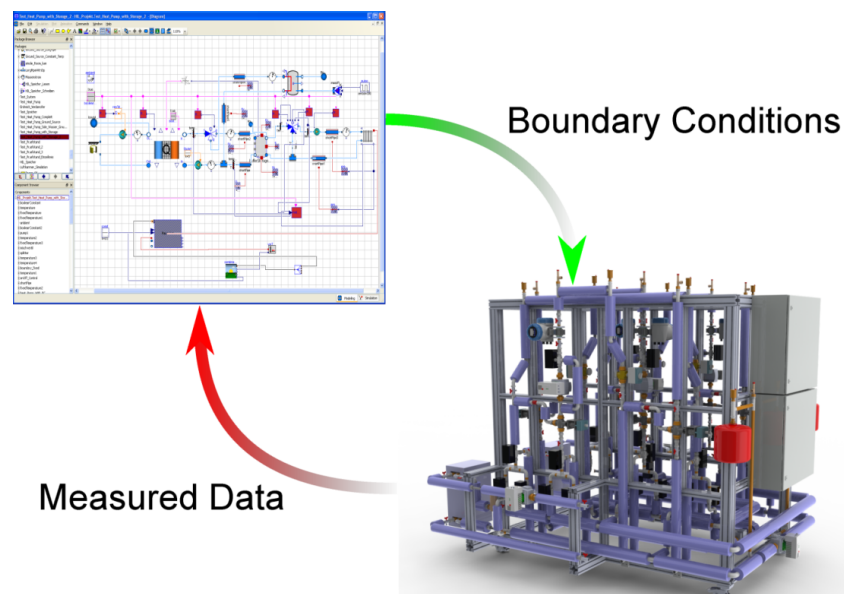


Figure 1 Principle of Hardware-in-the-Loop simulation

KEYWORDS:

Hardware-in-the-Loop, home energy system, home energy management system, heat pump, decentralised smart grid, smart homes, validation system