Coupling Power System Dynamics and Building Dynamics to Enable Building-to-Grid Integration

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Abstract

The interactions between power system dynamics and building dynamics are usually ignored or over-simplified in existing power system and building modeling and simulation tools, which limits how system modeling can support Building-to-Grid integration. This paper discusses a new approach to consider those interactions by modeling motor-driven building devices or systems. The motor-driven model is based on simplified mechanical rotation equations and allows us to study the coupling relationship between frequency/voltage in the power system and motor-driven device operation. This model is validated by performing one proof-of-concept case study with Modelica. The simulation results suggest that the proposed model can yield better representations of these interactions than the existing simplified models, especially the ones with the fast transient dynamics.