A Non-linear Stochastic Model for an Office Building with Air Infiltration - DTU Orbit (08/11/2017)

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This paper presents a non-linear heat dynamic model for a multi-room office building with air infiltration. Several linear and non-linear models, with and without air infiltration, are investigated and compared. The models are formulated using stochastic differential equations and the model parameters are estimated using a maximum likelihood technique. Based on the maximum likelihood value, the different models are statistically compared to each other using Wilk's likelihood ratio test. The model showing the best performance is finally verified in both the time domain and the frequency domain using the auto-correlation function and cumulated periodogram. The proposed model which includes air-infiltration shows a significant improvement compared to previously proposed linear models. The model has subsequently been used in applications for provision of power system services, e.g. by providing heat load reduction during peak load hours, control of indoor air temperature and for generating forecasts of power consumption from space heating.

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