

Re-formulation and Control of SKOV's Indoor Climate Stable Model Using Single-Zone Concept

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An efficient indoor climate control for a livestock stable not only means financial benefits in terms of less energy consumption, less maintenance costs and better production rates, but also gives a good animal welfare and helps reduce global warming problem. This kind of control system is usually sophisticated with respect to its expected functions of coordination and control of different components/subsystems' operations in some optimal sense. The development of an efficient and optimal climate control for a large-sized live-occupant building system is still far beyond mature comparing with the status for other industrial control systems [1,3].



Fig.1 A photo of a typical livestock (pigs) stable

By focusing on SKOV's real-sized testing facility in Syvsten, Denmark, as shown in Fig.2. Our previous work [1,2] investigated mathematical modeling for development and implementation of a model-based optimal indoor climate control for a real-sized livestock stable system.



Fig.2 Outside and inside of the SKOV's testing facility in Syvsten

This project aims to re-formulation the mathematical model of the previous version by improving its readability and consistency, meanwhile correct some errors in the model, e.g., the model has a very small time constant comparing with the real system; the filtering function of the isolation walls has not being modeled in the previous work [1,2]. The second objective is to improve the current control algorithm.

The comany provides testing data. All development and analysis can be done in Matlab/Simuink environment. There is no need to touch any hardwares.

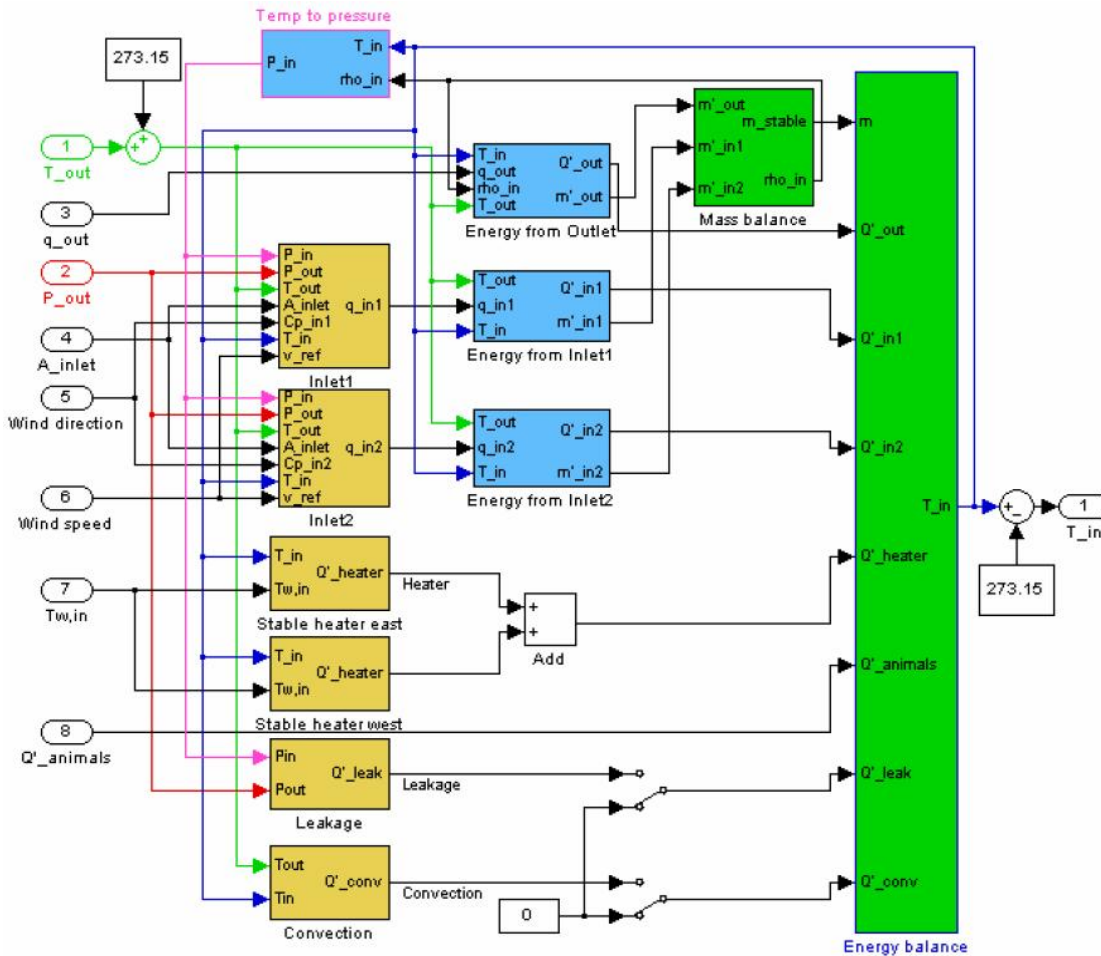


Fig.3 The Simulink model (top level) of the considered stable system [1,2]

References

[1] Zhenyu Yang, Stefan K. Greisen, Jette R. Hansen, Niels A. Pedersen, Martin R. Jensen (2009), "On the Single-Zone Modeling for Optimal Climate Control of a Real-Sized Livestock Stable System", in Proc. of [2009 IEEE International Conference on Mechatronics and Automation \(ICMA09\)](#), Changchun, Jilin, P.R. China, Aug 9-12, 2009. pp.3849-3854.

[2] Stefan K. Greisen, Jette R. Hansen and Niels A. Pedersen, "Efficient and reliable indoor climate control for livestock stables," Master Thesis, Aalborg University, Esbjerg Campus, Denmark, 2007.

[3] Z. Wu, P. Heiselberg, J. Stoustrup, "[Modeling and control of livestock ventilation systems and indoor environments](#)", {it in Proc. of AIVC 26th conference}, 2005, pp 335-340.