Applying Renowned Energy Simulation Engines to Neural Control System of Double Skin Façade

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Abstract : This paper is an overview of simulation tools used to model specific thermal dynamics that occurs while controlling double skin façade. Research has been conducted on simplified construction with single zone where one side is glazed. Heat flow and temperature responses are simulated in three different simulation tools: IDA-ICE, EnergyPlus and HAMBASE. The excitation of observed system, used in all simulations, was a temperature step of exterior environment. Air infiltration, insulation and other disturbances are excluded from this research. Although such isolated behaviour is not possible in reality, experiments are carried out to gain novel information about heat flow transients which are not observable under regular conditions. Results revealed new possibilities for adapting the parameters of the neural network regulator. Along numerical simulations, the same set-up has been also tested in a real-time experiment with a 1:18 scaled model and thermal chamber. The comparison analysis brings out interesting conclusion about simulation accuracy in this particular case.

Keywords : double skin façade, experimental tests, heat control, heat flow, simulated tests, simulation tools

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