HSLU Hochschule Luzern

Technik & Architektur

Bachelor‘s Thesis in Energy and Environmental Systems Engineering

Non-steady-state Behaviour of a Building

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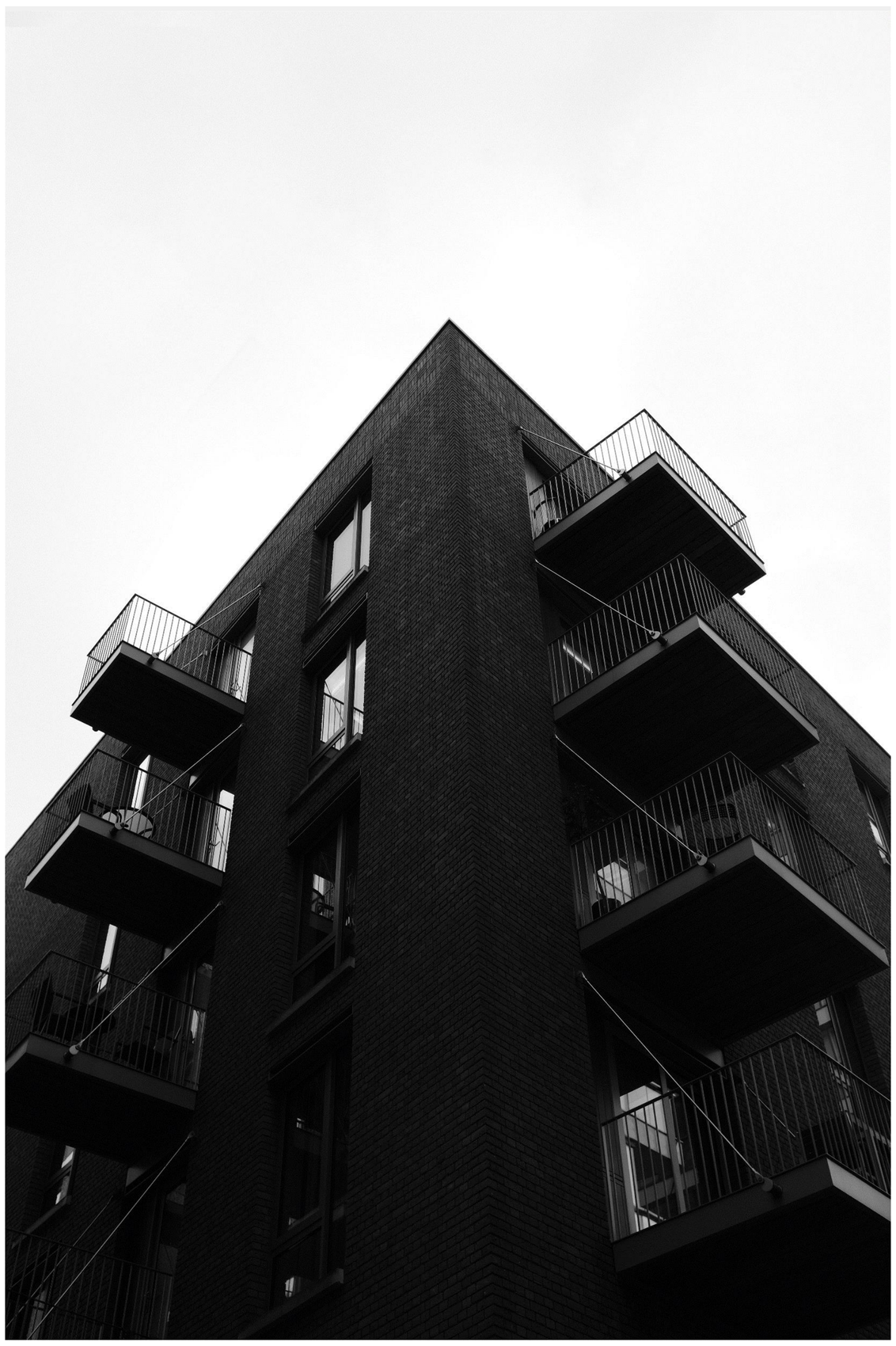

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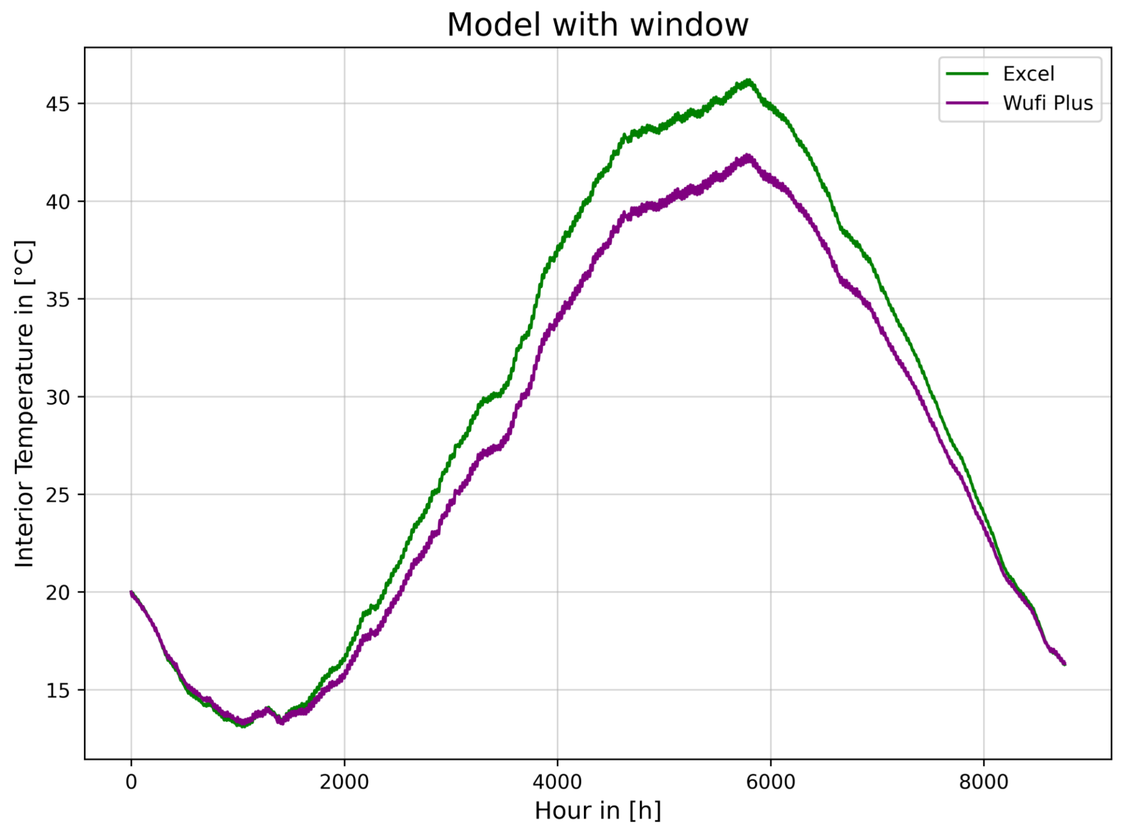

Buildings and CO2 emittance
Climate change, driven by soaring CO2 emissions, poses a significant threat. Switzerland, aiming for climate neutrality by 2050, faces a challenge in its building sector, a major CO2 emitter. Old buildings and reliance on fossil fuel heating contribute to excessive emissions. Inadequate renovations and insulation compound this issue. Transitioning to renewables and renovating buildings are crucial steps in curbing CO2 emissions and addressing climate change's impacts.

Building renovations for climate goals demand higher rates. Detailed planning, crucial for new or old structures, focuses on insulation parameters, displaying cost-saving potentials. Assessing existing buildings involves analyzing heating/cooling systems and insulation components like roofs, windows, and walls.

Executive Summary
This study aimed to analyze non-steady-state building behavior using a simplified simulation model, comparing it to the established WUFI Plus tool. An Excel model, based on room energy balance, was created and compared with WUFI Plus results. The simplified model, initially reduced to essential components, showed precise results, aligning closely with WUFI Plus, making it practical for daily planner use, especially in smaller buildings.

However, limitations exist, particularly in solar radiation calculations. Implementing shading, cooling, and heating could enhance the simplified model. Notably, WUFI Plus considers hygrothermal effects, a feature lacking in the simplified model.

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