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Using Tilted Façade to Reduce Thermal Discomfort in a UK Passivhaus Dwelling for a Warming Climate

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Abstract : This study investigated the potential negative impacts of future UK climate change on dwellings. In particular, the risk of overheating was considered for a Passivhaus dwelling in London. The study used dynamic simulation modelling software to investigate the potential use of building geometry to control current and future overheating risks in the dwelling for London climate. Specifically, the focus was on the optimum inclination of a south façade to make use of the building's shape to self-protect itself. A range of different inclined façades were examined to test their effectiveness in reducing the overheating risk. The research found that implementing a 115° tilted façade could completely eliminate the risk of overheating in current climate, but with some consequence for natural ventilation and daylighting. Future overheating was significantly reduced by the tilted façade. However, geometric considerations could not eradicate completely the risk of overheating particularly by the 2080s. The study also used CFD modelling and sensitivity analysis to investigate the effect of the façade geometry on the wind pressure distributions on and around the building surface. This was done to assess natural ventilation flows for alternative façade inclinations.

Keywords : climate change, tilt façade, thermal comfort, passivhaus, overheating
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