

A Comparative Analysis of Thermal Performance of Building Envelope Types over Time

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Abstract : Developments in architectural building typologies that are informed by prevalent construction techniques and socio-cultural practices generate different adaptations in the building envelope. While different building envelope types exhibit different climate responsive passive strategies, the individual and comparative thermal performance analysis resulting from these technologies is yet to be understood. This research aims to develop this analysis by selecting three building envelope types from three distinct building traditions by measuring the heat transmission in the city of Beirut. The three typical residential buildings are selected from the 1920s, 1940s, and 1990s within the same street to ensure similar climatic and urban conditions. Climatic data loggers are installed inside and outside of the three locations to measure indoor and outdoor temperatures, relative humidity, and heat flow. The analysis of the thermal measurements is complemented by site surveys on window opening, lighting, and occupancy in the three selected locations and research on building technology from the three periods. Apart from defining the U-value of the building envelopes, the collected data will help evaluate the indoor environments with respect to the thermal comfort zone. This research, thus, validates and contextualizes the role of building technologies in relation to climate responsive design.

Keywords : architecture, wall construction, envelope performance, thermal comfort

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