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Facade retrofit framework for existing office buildings

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The building industry is faced with a vast stock of existing buildings that are not sustainable and suffer from poor conditions in terms of physical problems. Energy retrofitting of existing buildings is considered as a rational strategy to minimize buildings' environmental impact in the long term. Standard building retrofits focus on prescriptive measures to comply with energy standards rather than occupant requirements. In contrast, the proposed performance-based retrofit approach focuses primarily on indoor comfort to leverage the non-energy benefits of retrofit besides the strategies to improve the energy performance of the building. Specifically, in the case of office buildings, most of the energy-saving options and required high levels of indoor comfort are in conflict with each other and need to be balanced. This study argues the current approaches to the facade retrofit decisions in the case of existing office buildings in mixed-dry climates by incorporating both values of energy efficiency and indoor comfort measures for office buildings with different spatial organizations. The main contribution is presenting the state-of-the-art in building energy retrofit and proposing a performance-based facade retrofit framework. This framework aims to relate occupant comfort requirements to building facade performance. The proposed framework can be used by stakeholders and end users throughout the initial stages of a retrofit process. It can also form the basis of decision-support tools that can be developed in the future.

Biography

Negin Jahed is a Ph.D. A student in Conservation of Cultural Heritage program at Middle East Technical University, originally from Tabriz, Iran. She got her BS degree in Architectural Engineering from the Islamic Art University of Tabriz in 2012. Between the years 2012 and 2014 she worked at Farazab Consulting Engineers in Tabriz, Iran. She gained her Master degree in Architecture from Middle East Technical University, Ankara, Turkey, in 2017. She has developed the facade retrofit framework during her master studies under the supervision of Assist. Prof. Dr. Gürsel Dino. This framework can be used as a decision support retrofit framework used by involved stakeholders in the energy retrofit projects. Currently, her research at Middle East Technical University is consisting of studying on energy retrofitting of historical buildings with a specific focus on developing a multi-objective optimization model for energy retrofitting of public historic buildings.

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