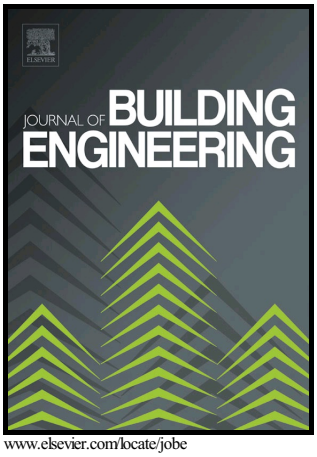
Shading devices optimization to enhance thermal comfort and energy performance of a residential building in Morocco

Haitham Sghiouri, Ahmed Mezrhab, Mustapha Karkri, Hassane Naji



www.elsevier.com/locate/jobe

PII: S2352-7102(17)30660-5
DOI: https://doi.org/10.1016/j.jobe.2018.03.018
Reference: JOBE440

To appear in: *Journal of Building Engineering*

Received date: 26 October 2017
Revised date: 18 March 2018
Accepted date: 22 March 2018

Cite this article as: Haitham Sghiouri, Ahmed Mezrhab, Mustapha Karkri and Hassane Naji, Shading devices optimization to enhance thermal comfort and energy performance of a residential building in Morocco, *Journal of Building Engineering,* https://doi.org/10.1016/j.jobe.2018.03.018

Shading devices optimization to enhance thermal comfort and energy performance of a residential building in Morocco

Haitham Sghiouri[a], Ahmed Mezrhab[a]*, Mustapha Karkri[b], Hassane Naji[c,d]

[a]Université Mohamed Premier, Mechanics and Energetic Laboratory, 60000, Oujda, Morocco.

[b]Université Paris-Est, CERTES, 61 Avenue du Général de Gaulle, 94010 Créteil Cedex, France

[c]Univ. Artois, Civil Engineering and Geo-Environment Laboratory (LGCgE - EA 4515), F-62400 Béthune, France.

[d]Lille University Northern France, LGCgE - EA 4515, F-59000 Lille, France.

*Corresponding author. amezrhab@yahoo.fr (A. Mezrhab)

ABSTRACT

Morocco's building sector accounts for about 25% of the country's total energy consumption, including 18% for residential and 7% for the services sector. This energy consumption is expected to raise due to the significant rise of household equipment rate in HVAC facilities mainly air-conditioners. This work presents a methodology combining single-objective optimization and building energy simulation, applied to the study of the effect of optimized overhangs, aimed at improving thermal comfort of a typical two-storey Moroccan existing building in three different climates of Marrakech, Casablanca and Oujda. The optimization has been performed using the non-dominated sorting genetic algorithm (NSGA-II). Optimal and benchmark cases are compared regarding the percentage of annual discomfort, cooling demand and heating demand. The results show that the thermal comfort is improved, and the optimized overhangs reduce the cooling demand by 4.1% for Casablanca's mediterranean climate, which exhibits no contradiction between improvements in thermal comfort and performance.