World Academy of Science, Engineering and Technology
International Journal of Civil and Environmental Engineering
Vol:9, No:07, 2015

Thermal Behavior of a Ventilated Façade Using Perforated Ceramic Bricks

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Abstract : The ventilated façade has great advantages when compared to traditional façades as it reduces the air conditioning thermal loads due to the stack effect induced by solar radiation in the air chamber. Optimizing energy consumption by using a ventilated façade can be used not only in newly built buildings but also it can be implemented in existing buildings, opening the field of implementation to energy building retrofitting works. In this sense, the following three prototypes of façade where designed, built and further analyzed in this research: non-ventilated façade (NVF); slightly ventilated façade (SLVF) and strongly ventilated façade (STVF). The construction characteristics of the three facades are based on the Spanish regulation of building construction “Technical Building Code”. The façades have been monitored by type-k thermocouples in a representative day of the summer season in Madrid (Spain). Moreover, an analysis of variance (ANOVA) with repeated measures, studying the thermal lag in the ventilated and no-ventilated façades has been designed. Results show that STVF façade presents higher levels of thermal inertia as the thermal lag reduces up to 100% (daily mean) compared to the non-ventilated façade. In addition, the statistical analysis proves that an increase of the ventilation holes size in STVF façades does not improve the thermal lag significantly ($p > 0.05$) when compared to the SLVF façade.

Keywords : ventilated façade, energy efficiency, thermal behavior, statistical analysis
Conference Title : ICACEE 2015 : International Conference on Architectural, Civil and Environmental Engineering
Conference Location : Stockholm, Sweden
Conference Dates : July 13-14, 2015