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Thermal and economic evaluation of a new thermal insulation materials based on textile waste for building envelope

Ayoub Gounni[1], Mohamed El Wazna[2], Mohamed Tahar Mabrouk[3], Abdelhamid Kheiri[3], Mustapha El Alami[1], Abdeslam El Bouari[2] and **Omar Cherkaoui[4]**
[1]LPMMAT laboratory, Morocco
[2]LPCAM laboratory, Morocco,
[3]LEMTA laboratory, France
[4]REMTEX laboratory, Morocco

Sustainability in buildings are currently evaluated not only based upon thermal insulation thickness and heating demand, but also according to primary energy demand, CO_2 reductions, and ecological properties of the building materials. Ecological insulation materials have been available on the market for a long time; however, conventional materials are still predominantly used. In this work, the potential applicability of a recycled textile materials, based on acrylic and wool waste is investigated. The thermal insulation materials are fabricated by needle punching technique which is based on mechanic consolidation. The developed insulations are thermo-physically characterized in term of density, air permeability and thermal conductivity. Their properties are inserted into a numerical model, which simulates an external wall exposed to the real climatic conditions of Casablanca, Morocco, in order to study their thermal performance. Finally, an economic model based on life cycle cost analysis (LCC) is adopted to investigate the competitiveness of the developed insulation based on their cost. An interesting result is obtained in terms of thermal performance and cost and will be presented in the conference.

gounni.ayoub@gmail.com