Sound Absorbing and Thermal Insulating Properties of Natural Fibers (Coir/Jute) Hybrid Composite Materials for Automotive Textiles

Authors : Robel Legese Meko

Abstract : Natural fibers have been used as end-of-life textiles and made into textile products which have become a well-proven and effective way of processing. Nowadays, resources to make primary synthetic fibers are becoming less and less as the world population is rising. Hence it is necessary to develop processes to fabricate textiles that are easily converted to composite materials. Acoustic comfort is closely related to the concept of sound absorption and includes protection against noise. This research paper presents an experimental study on sound absorption coefficients, for natural fiber composite materials: a natural fiber (Coir/Jute) with different blend proportions of raw materials mixed with rigid polyurethane foam as a binder. The natural fiber composite materials were characterized both acoustically (sound absorption coefficient SAC) and also in terms of heat transfer (thermal conductivity). The acoustic absorption coefficient was determined using the impedance tube method according to the ASTM Standard (ASTM E 1050). The influence of the structure of these materials on the sound-absorbing properties was analyzed. The experimental results signify that the porous natural coir/jute composites possess excellent performance in the absorption of high-frequency sound waves, especially above 2000 Hz, and didn't induce a significant change in the thermal conductivity of the composites. Thus, the sound absorption performances of natural fiber composites based on coir/jute fiber materials promote environmentally friendly solutions.