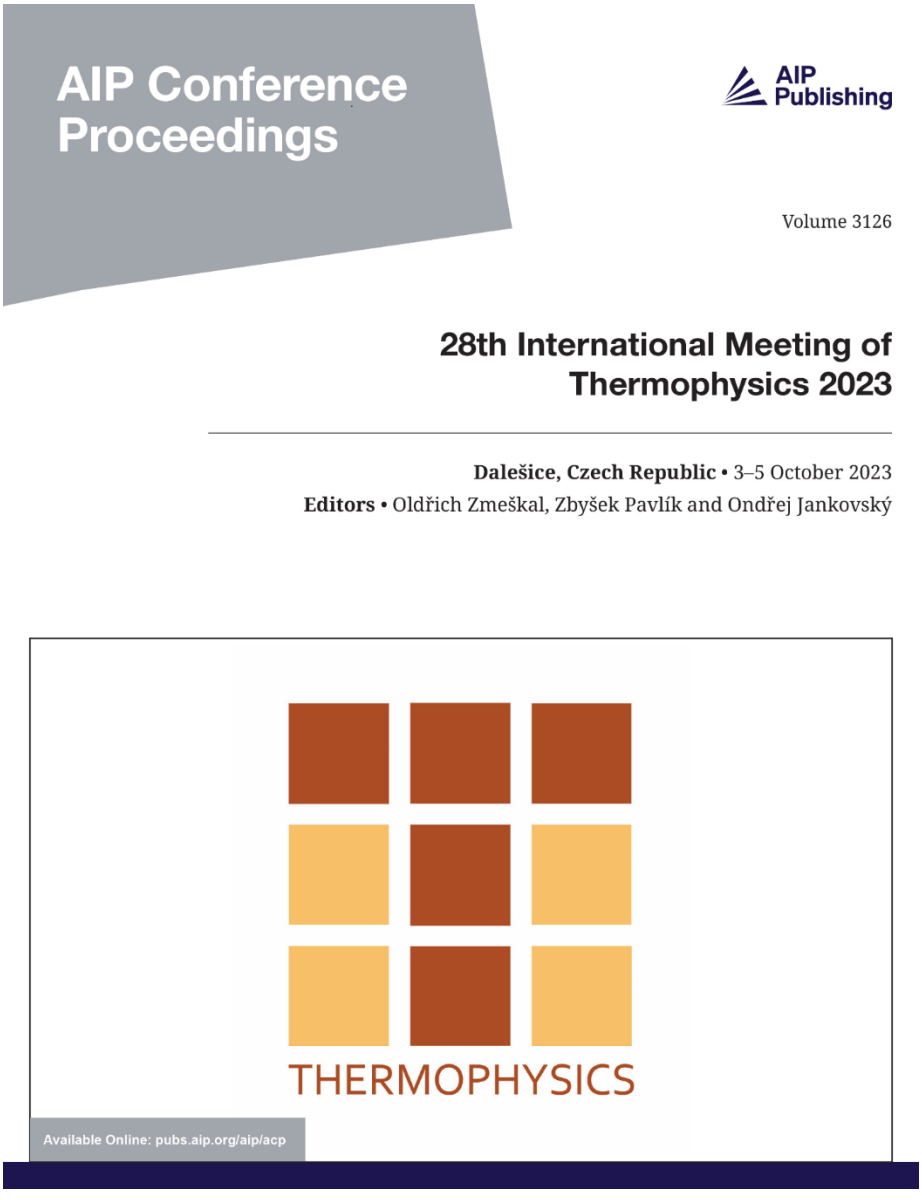


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# Abstract:

# The Influence of The Flatness of The Particleboard Composite Samples on The Accuracy of The Measurement of Thermal Properties by Pulse Transient Method

Vlastimil Boháč[1, a)] Rupali Tiwari[1,2, b)], Lubos Kristak[2, c)], Roman Réh[2, d)], Ján Hudec[1, e)], Vladimír Štofanik[1, f)], Valentina Lo Giudice[3, g)], Luigi Todaro[3, h)]

[1]*Institute of Physics, Slovak Academy of Sciences (IP SAS), Dúbravská cesta 9,84511 Bratislava, Slovakia.*
[2]*Faculty of Wood Sciences and Technology, Technical University in Zvolen, T. G. Masaryka 24, 96001 Zvolen, Slovakia.*
[3]*School of Agricultural, Forestry, Food and Environmental Sciences, University of Basilicata, Viale dell'AteneoLucano 10, 85100 Potenza, Italy.*

[a)]*Corresponding author:* vlastimil.bohac@savba.sk
[b)]rupali.tiwari@savba.sk; (tiwari@tuzvo.sk)
[c] kristak@tuzvo.sk
[d)]reh@tuzvo.sk
[e)]jan.hudec@savba.sk
[f)]vladimir.stofanik@savba.sk
[g)]logiudicevalentina2@gmail.com
[h)]luigi.todaro@unibas.it

**Abstract**. Recently, new composite materials based on natural wood-based materials have been increasingly used in modern construction of houses because of their good physical, mechanical and thermal insulation properties. This raises the need to characterize their Thermophysical properties. As part of our project 'Research of selected properties of sustainable insulating materials with the potential for use in wooden buildings', we measured samples of High and Middle density particleboards made from chips of Turkey oak wood (Turkish oak HDPB, Turkish oak MDPB) and samples made from mixture of Turkey Oak wood and Orange wood (OOPB). A cuboid model for the pulse transient method was used to estimate the parameters. The model takes into account the cuboid geometry of the sample with a square base, the heat losses from the free surface of the sample to the surroundings using the coefficient of heat transfer from the surface of the sample to the surroundings in the lateral direction, as well as the infinitely large heat capacity of the heat exchangers between which the sample is placed. The heat transfer coefficient between the heat source and the sample is infinitely large. The surface of the particleboard is usually rough and porous due to the size and nature of its particles. In addition, the interfaces of the three parts of the sample set are hand-polished, so that the edges and corners are not perfectly flush with the central area of the surface. As a result of manual polishing, the interfaces at the corners and edges of the sample parts usually have air-filled gaps. Free gaps cause additional thermal resistance to heat flow from the heat source to the body of the sample. Then, the coefficient of heat transfer from the heat source to the sample is not infinitely large and does not correspond to the conditions of the cuboid model. While the Turkey Oak HDPB had a perfectly flat surface, the Orange-Oak PB suffered from loose gaps at the interfaces. Therefore, we filled them with silicone glue as a thermal contact agent and measured them again. The consequence of flatness differences for all results was discussed within the theoretical analysis based on sensitivity coefficients, uncertainty calculations, as well as the assumption of a thermally dependent heat transfer coefficient between the heat source, air gap and the sample. The criterion for the quality of the fitting of the thermal responses by the cuboid model was the residual graph within the thermal noise of the thermocouple ± 0.005 K.