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## **Experimental and numerical investigation of lightweight floor heating with metallised polyethylene radiant sheet**

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### **Abstract**

Radiant floor heating is growing in popularity, creating a need to research new constructions that generate low investment costs and at the same time assure high thermal efficiency. This paper presents the construction of lightweight floor heating with a radiant polyethylene sheet coated with a thin layer of aluminium. This construction has not been researched yet, hence the experiment and numerical calculation were performed to determine its thermal performance. Two experimental stands were constructed: with and without the polyethylene sheet. Five numerical models of floor heating were developed: two models of the research stands, a model of inter-floor ceiling with and without the analysed polyethylene sheet, and a model of construction with an aluminium sheet. Operating parameters of each construction were determined for variable heating medium temperature, heat resistance of floor covering and pipe spacing. The influence of the type of radiant sheet on thermal performance of lightweight floor heating was analysed. Results of experimental and numerical research showed that the use of polyethylene metallised sheet increased floor heating surface heat flux in comparison to construction without a radiant sheet even by 105%. At the same time, heat flux of construction with the polyethylene sheet was lower by 43-66% from heat flux of floor heating with an aluminium radiant sheet and the surface temperature distribution was more uneven.

**Keywords:** radiant floor; polyethylene radiant sheet; dry floor heating system; experiment; numerical study

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