

A new simplified model to calculate surface temperature and heat transfer of radiant floor heating and cooling systems - DTU Orbit (08/11/2017)

A new simplified model to calculate surface temperature and heat transfer of radiant floor heating and cooling systems

In this paper, a new simplified model to calculate surface temperature and heat transfer of radiant floor heating and cooling system was proposed and established using the conduction shape factor. Measured data from references were used to validate the proposed model. The results showed that the maximum differences between the calculated surface temperature and heat transfer using the proposed model and the measured data were 0.8 °C and 8.1 W/m² for radiant floor heating system when average water temperature between 40 °C and 60 °C. For the corresponding values were 0.3 °C and 2.0 W/m² for radiant floor cooling systems when average water temperature between 10 °C and 20 °C. Numerically simulated data in this study were also used to validate the proposed model. The results showed that the surface temperature and heat transfer of radiant floor calculated by the proposed model agreed very well with the numerically simulated data when average water temperature changing from 25 °C to 45 °C for radiant floor heating systems and from 10 °C to 20 °C for radiant floor cooling systems. Hence, the proposed model was validated to be applicable and was believed to be potentially beneficial for the design and control of radiant floor heating and cooling systems. © 2015 Elsevier B.V. All rights reserved.

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