This topic is "practice ready." ☒ **Yes** ☐ **No**

3D Finite Element Modeling of Electrically Conductive Concrete

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Abstract

Confronting snowfall and pavement icing at airports in order to prevent long delays in scheduled flights has always been a challenge for airliners and the airport authorities. To address these concerns, electrically conductive portland cement concrete (ECON) is currently a focus area of pavement design. This method applies a potential difference to a surface/near-surface conductive concrete layer, heating up the pavement to melt the snow and ice. However, due to the complexities of ECON performance measurements, most studies use experimental research methods to examine the conductive concrete's ability to remove accumulated snow. Nevertheless, experimental research is expensive and time consuming. Therefore, this study develops a 3D finite element (FE) model of ECON, validated through experimental data, for evaluating its thermal performance considering different climatic conditions. The sensitivity of the heat generation to material parameters of the ECON is investigated to determine the required accuracy for measuring each parameter and possible errors in the results. Initial results of the temperatures on the top surface of the FE model are consistent with experimental data collected over a variety of climate conditions, which indicates that a FE model would be promising for use in feasibility studies and preliminary design and control strategy development of the conductive pavement systems.

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Keywords: Electrically Conductive Concrete—Heated Pavement—Snow Removal —Airport Pavement—Cold Regions