Thermally and Mechanically Balanced Structural Design of Insulated Pavements for Cold Region Applications
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**Background and Objective**
- Add an insulation layer above the frost-susceptible layer have been proved to be an efficient strategy to mitigate frost effect on pavements in cold regions.
- Limited research was conducted on the thermal and mechanical design of insulated pavement

**Objective:** Propose a thermally and mechanically design approach based on a novel finite element model

**Methodology and Finite Element Model**

1. **Start**
2. Select Failure Limits or Design Criteria and Reliability Level
3. Select Trial Design Structure
4. Estimate Thermal and Mechanical Responses based on the FE Model
5. Predict Performance and Maximum Allowable Traffic ESALs
6. **End**
7. **Yes**
   - Meet the Criteria
   - Output Results
8. **No**
   - Loading area
   - Load model

**Experimental Setup**
- Schematic view of insulated pavement boxes
- Photos of insulated pavement boxes

**Results and Discussion**

1. Predicted thermal and mechanical responses
2. Maximum Load Repetitions of Insulated Pavement (millions)

**Conclusions**
- The design of insulated pavements need to consider the differential icing effect and mechanical performance.
- Design tables were formulated based on the FE model and selected criteria.

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