Towards a Quantitative Prediction of Ice Forming at the Surface of Airport Runways

J.-D. Wheeler[1], P. Namy[1], M. Rosa[1], L. Capobianco[1]

[1]SIMTEC, Grenoble, France

Abstract

Anticipation of meteorological events such as ice forming is a key challenge to optimise the use of antifreeze on airport runways. To obtain a predictive numerical tool of ice forming on the runways, Groupe ADP and SIMTEC developed a COMSOL Multiphysics® model, in which several physical phenomena contributing to the temperature variations of the runway are involved. Radiative exchanges occur from and to the atmosphere together with the solar radiations. Moreover, the underground thermal inertia has a key role as it varies depending on the season and the runway temperature of the previous days. At last, the wind is also a source of thermal variation because of the convection.
A comparison with temperature measurement on the runway provides an evaluation of the model abilities. Whereas some phenomena contribution precision should be improved, the computation results are in agreement with the experimental measurements.
Thanks to the numerical model, the different thermal contributions are gathered and the variation of the temperature is computed over time at the surface and in the different layers of the runway foundation.

Figures used in the abstract

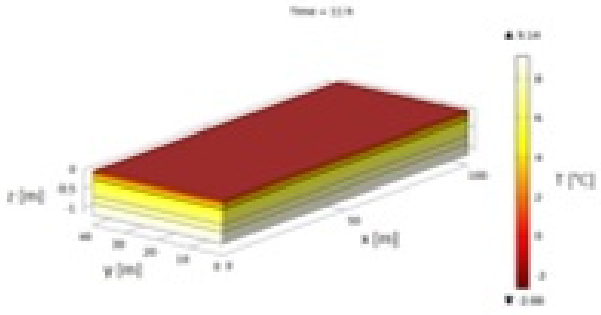

Figure 1: Temperature distribution on a runway and its foundation