

Numerical Analysis of Fire Performance of Timber Structures

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Abstract : An efficient numerical method has been developed to incorporate the effects of heat transfer in timber panels on partition walls exposed to real building fires. The procedure has been added to the software package Abaqus/Standard as a user-defined subroutine (UMATHT) and has been verified using both time- and spatially dependent heat fluxes in two- and three-dimensional problems. The aim is to contribute to the development of simulation tools needed to assist structural engineers and fire testing laboratories in technical assessment exercises. The presented method can also be used under the developmental stages of building components to optimize performance in real fire conditions. The accuracy of the used thermal properties and the finite element models was validated by comparing the predicted results with three different available fire tests in literature. It was found that the model calibrated to results from standard fire conditions provided reasonable predictions of temperatures within assemblies exposed to real building fire.

Keywords : Timber panels, heat transfer, thermal properties, standard fire tests

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