CERIS : Civil Engineering Research and Innovation for Sustainability

Safety analysis of buildings in contact with wildfire through computational simulation

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Summary

The propagation of wildfire in urban areas, called wildland-urban interface fires, causes serious loss of life and property. This is one of the reasons why the study of wildfires and their impact on communities has been receiving increasing attention from researchers and public policy makers. In order to address the problem, field tests and computer simulations can be used.

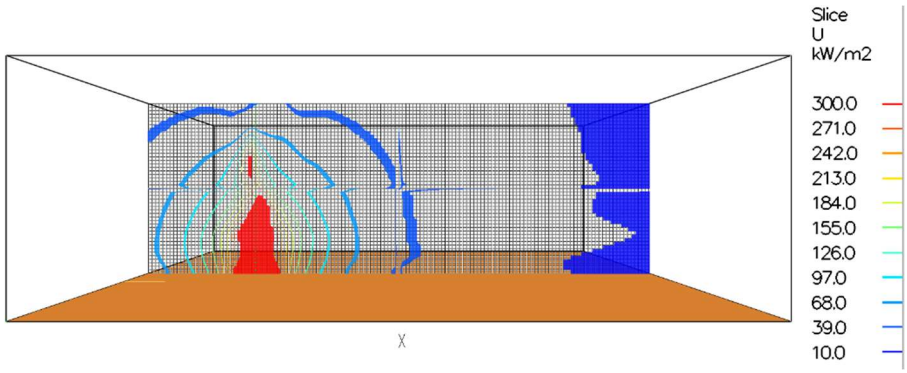
Certainly, field tests have great relevance, however, they are expensive tests and they also have limitations regarding the real conditions of weather, vegetation and topography. In this context, the objective of this project is to use computer simulation to estimate the thermal exposure of buildings during wildfire in the wildland-urban interface, considering the possibility of combustion of wooden constructive elements.

Currently, there is a lot of research relate to the propagation of fire in the forest field, as well as the thermal simulation of the effect of fire inside a building. On the other hand, the simulation of the temperature of a wildfire in contact with a building still lacks scientific publication. This area of investigation is fundamental so that in the future it would be possible to finally protect homes from being consumed when they are hit by a wildfire. In addition, understanding thermal exposure characteristics such as temperature and heat flux is an important step in developing standard testing methodologies, heating curves, and methods for verifying the safety of structures in a wildfire exposure situation.

In order to simulate the thermal exposure of the building, the FDS (Fire Dynamics Simulator) software from NIST will be used to simulate fluid dynamics and heat transfer. This software has open packages that can be modified and explored if necessary in order to adapt it to the problem under study.

Keywords

Wildfire safety, wildland fire, wildland-urban interface, fire dynamics; computational.



Numerical simulation of radiation exposure from fire.