



Engineering Sciences Section – 2003

C15 The Use of Fire Modeling in Fire Investigations: Overview and Case Studies

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The goals of this presentation are to educate the forensic community about the potential use of computer fire modeling in fire investigations.

The presentation will focus on FDS (Fire Dynamics Simulator), a computer-based computational fluid dynamics fire model. By providing inputs regarding the building, available fuels, and fire scenario, the model makes dynamic predictions of the fire physics throughout the fire duration, including temperature, visibility, heat flux, gas concentrations, smoke spread, and fire spread. Three-dimensional graphical visualizations (animations) can be created from the modeling results that are representative of the fire scene. Fire modeling can be used to simulate a fire event in an attempt to compare predicted burn patterns and reported fire behavior to those observed at the scene. These simulations can help fire investigators better understand the modes by which a fire could grow and spread throughout the space and the effects that the smoke and heat can have on the building and its occupants. Variables such as open doors and windows, fuel load, and fire growth may be changed easily and used to analyze multiple fire scenarios or to perform a sensitivity analysis on a particular scenario. Fire modeling can also be used to support or discredit eyewitness statements and assist in developing a more accurate timeline of events. Where possible, fire scenarios may be physically reconstructed and burned in a laboratory environment to gain actual fire test data. By comparing test data to the model predictions, the model can be calibrated and used for further simulations when additional fire tests are not economically feasible. The presentation will provide examples for the uses described above and illustrate the benefit of utilizing FDS in a fire investigation.

Fire Modeling, Fire Investigations, Fire Dynamics Simulator