Modelling and numerical simulation of smoldering in piles of solid flammable fuels

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Funded by: Max-Buchner-Foundation
Duration: 01.07.2006 - 30.06.2008

Motivation

The risk of self-ignition and smoldering in piles of solid flammable fuels is a major safety-related problem. In case of sufficient oxygen supply this phenomenon can lead to an open fire.

Problem

The objective of the study is to describe the smoldering process with a multi-scale fixed-bed-reactor model. This model is by far more complex than previous attempts to describe smoldering.

Solution

With the multi-scale reactor model the pyrolysis of wood particles has already been numerically simulated with success. The phenomena occuring during pyrolysis are exactly the same as in case of smoldering. Thus, the task is to adjust the parameters and to do numerical simulations of smoldering. The numerical simulation results shall be compared with experimental data as well as with simulation results that have been obtained by commonly used continuous reactor models. Thus, it will be possible to examine the benefits of multi-scale modelling with respect to the smoldering process.

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