PHYSICAL MATHEMATICS SEMINAR

SPONTANEOUS IGNITION – ASSESSMENT OF CAUSE

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ABSTRACT:

The classical theory of thermal condition has been developed using the stationary theory for a nonlinear heat conduction equation. The ignition threshold is then obtained as a bifurcation point in parameter space. This is well-suited for obtaining the critical storage conditions in steady ambient conditions. Recently a raft of consulting problems have arisen where the ignition is triggered by "super-critical" initial conditions – that is, the material stored in safe ambient conditions, but is assembled too hot. Similarly, situations are now arising in applications where the variations in the ambient temperature can trigger a thermal spontaneous ignition, while the average suggests that the material is sub-critical. Thus new algorithms are needed to determine critical thresholds for both these transient scenarios to provide under-pinning decision support for legal assessments.

Numerical procedures have been developed for this purpose for defining the thresholds for thermal ignition for both of these scenarios. These are expected to be made available commercially to assist assessment of new ignition scenarios. The shape of the initial temperature profile is also investigated, using the moments of the profile. Recent cases of marine fires caused by bulk Calcium Hypochlorite (a cleansing powder) in transit have been resolved in the courts using this methodology.

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TUESDAY, NOVEMBER 20, 2007
2:30 PM
Building 2, Room 105

Refreshments at 3:30 PM in Building 2, Room 349
(Applied Math Common Room)