Computer Models
For
Fire and Smoke

Model Name: HARVARD MARK VI Multi-Room Fire Simulation

Very Short Description: 10 Rooms, 20 Vents, 3 Fire Types, Single Floor Fire Simulation (Zone Model)

Modelers, Organizations: J. Ransdell, J.B. Gahm, H. Emmons, Harvard University; H. Mitler, J. Rockett, National Institute of Standards and Technology.

References: 1. Gahm, J.B., "Computer Fire Code VI," (2 vols), NBS-GCR 83-451, Dec. 1983.
2. Rockett, J., "Using the Harvard/National Institute of Standards and Technology Mark VI Fire Simulations," NISTIR 4464, National Institute of Standards and Technology, Gaithersburg, MD, November 1990.

Availability: Dr. John A. Rockett, 4701 Alton Place, N.W., Washington, DC. Please include 1 3½", 1.4 MB or 3 5½", 364 kB floppy disks.

Hardware: IBM PC (or clone) with math co-processor or "Super Mini" such as VAX 11-780, "Work Station" or Mainframe

Language: FORTRAN 77

Size: 582 kB

Detailed Description:
Input:

Room Geometry – maximum 10 rooms
Wall material thermal properties
Vent Geometry – maximum 20 vents
Forced Vent Flow rate/time or "free" vent
Fire Geometry – for up to 3 burning objects per room
Fuel Physical/Chemical Properties – 3 fire types: "Gas burner" (as in "Pool")
FIRST "Growing", Harvard V

Output:

(Versus Time at User-specified intervals)
14 Upper (hot) layer variables for each room
14 Object variables for each object
3 Vent variables for each vent
4 Wall variables – 1 wall per room

Other Features:

An auxiliary program, "PREPLOT," facilitates graphical presentation of data.
User selectable: 5 different plume models

Limitations:

All floors must be at the same height

Ceiling heights may vary, but this feature must be used with caution, to prevent mixing between gas layer at vents.

No floor heating.

Occasionally fails to converge (numerically).

Execution times can be long depending on case.

Advantages:

Multiple fires in multiple rooms.

Multiple fire types.

3 overlapping fire in one room may be used to simulate complex burning behavior with more interaction effects than is possible with the programmed gas burner.