**FPST 3373 Lab week 11 Date: Name: Xinyu Liu**

S**ubmit #2 using excel spreadsheet: three flame spread rates in one figure.**

1. Measure the time for the flame front to reach the relevant distance from the ignition point.
   1. 30 degree: concurrent flow flame spread

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Dist. | 2 inch | 4 inch | 6 inch | 8 inch | 10 inch |  |
| Time[s] | 19 | 38 | 85 | 121 | 162 |  |

* 1. 45 degree: concurrent flow flame spread

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Dist. | 2 inch | 4 inch | 6 inch | 8 inch | 10 inch |  |
| Time[s] | 9.5 | 29 | 50 | 67 | 89 |  |

* 1. 60 degree: concurrent flow flame spread

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dist. | 2 inch | 4 inch | 6 inch | 8 inch | 10 inch |
| Time[s] | 7 | 17 | 26 | 37 | 46 |

1. Plot the three flame spread rates in one figure.
2. **The bottom half of a vertically oriented 0.4 m long, 0.1 m wide, 2 mm thick plywood (thermally thick) was exposed to heat flux of 60 kW/m2. It was ignited at 5 s. The 60 kW/m2 heat source was removed after ignition and uniform heat flux of 20 kW/m2 was applied to the surface from a 0.3 m tall flame. Calculate the surface ignition temperature and the upward fire spread rate with the following properties.**

Density = 540 kg/m3, thermal conductivity = 0.12 W/m-K, specific heat = 2.5 kJ/kg-K. Initial temperature = 20oC with total radiative and convective heat transfer coefficient is 20 W/m2-K.Ts=120oC.

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1. **When the thickness of the plywood in the question above is 0.6 mm (thermally thin), calculate the surface ignition temperature and the upward fire spread rate.**

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