**FPST 3373 Lab week 11(or 12) Date: 2022/11/10 Name: Xinyu Liu**

Based on the fuel mass data on the course website, calculate the followings for both free burn case and the fire tornado case.

1. The total amount of heptane (g)

Regular Pool Case: 1.11kg

Fire Tornado Case: 1.13 kg

1. The total burning period (s)

Regular Pool Case: 415s

Fire Tornado Case: 1.13 kg

1. The total heat released (kJ)

Regular Pool Case: 49854

Fire Tornado Case: 1.13 kg

1. Plot the mass burning rate (g/s) in chart.

Avg. Regular Pool Case: 2.69g/s

Avg. Fire Tornado Case: 4.41(g/s)





1. Plot the heat release rate (kW) in chart.

1. The calculated HRR based on the correlation in the lecture note for the free burn case (kW).



1. Describe the difference between the calculated HRR and the measured HRR (in question 5).

Calculated HRR 126.1kW

Measured HRR 120.2kW

There is no apparent gap between the calculated HRR and the measured HRR.

And the Measured HRR is slightly than the calculated one, due to the heat losing in reality. Actually, there is still more heating losing that is not taken into consideration yet. For example, the radiation and conduction. Besides, the heptane used in this experiment is not pure.

1. Describe the difference between the free burn HRR and the fire tornado HRR and explain why they are different in terms of burning period, mass burning rate, heat release rate.

* Fuels burns faster in tornado than that of the regular pool.
* The HRR is large in tornado fire.

It can be observed clearly that tornado fire has a much mor significant turbulent blending effect, increasing the reacting speed as well as the other reacting speed.

By the way, the faster burning speed will also increase the heat transfer, and increase the maximum temperature.