Summary-IMFSE Master thesis-Leo Willem (Maryland)

* Pyrolysis model developed based on the first order Arrhenius equation
* Firebrands exposed to higher temperatures are fully pyrolyzed in the first seconds.
* Firebrands exposed to lower initial temperatures pyrolyzing sustain a long time.
* The thermal inertia of firebrands increases with the thickness and the density.
* Char oxidation has not been considered

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| Tree crown fire | 100 MW : over 5 m 🞨10 m 🞨 5 m region by pyrolysis gaseous MLRPUA |
| Wind speed | 6.7 m/s (chosen the medium value of Sardoy et al.) Monin-Obukov |
| Firebrand shape | discs |
| Firebrand size | 4-10 cm diameter and 0.2 mm-100 mm thickness |
| Ember initial T | 1044 0C (time-averaged local gas temperature) |
| Domain | 1001 m 🞨304 m 🞨140 m and  16 meshes (1 🞨 0.5 m, 5 🞨 1 m, 4 🞨 2 m, 6 🞨 4 m) |

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**Grid independence** done for **0.5 m** , **0.25 m**, **0.125 m** in terms of temperature and velocity vs height.

Considered the graphical nature of plots and the % difference of peak-to-peak.

Post processing

Mass and temperature of particles analysed by tracking along the position over the time by MATLAB postprocessing.

Conclusion

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| Firebrands are not lofted by plume and land on the ground flaming with maximum travel distance of 10 m in the downstream. |
| Firebrands are lofted by plume and travel at least 50 m from the fire. |

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Prescribed forest fire-Filkov et al.

* Increased the depth of the fire up to 7 m based on ROS and fire residence time. **(Ongoing)**
* Sensitivity analysis to examine the effect of firebrand initial temperature on trajectories **(Ongoing)**.

(initial temperatures were taken from Wadhwani et al. (311 0C) and Leo Willem et al. (1044 0C)

Writings

1. Determining firebrand generation rate using physics-based modelling from experimental studies through inverse analysis (**Almost completed-need to arrange all post-processing images into the same format, tables**)
2. Abstract and the presentation for ISILC (**completed**)
3. Review paper (**completed**)