Higher order poly. curve fit (95% confidence level)

**Numerical Simulations**

**Conclusions**

- The ignition delay time varied from 0.4 to 8.5 ms as the main chamber ethylene-air mixture was varied from $\phi=0.4$ to 2.4.
- The ignition delay time varied from 1.5 to 11.5 ms in the main chamber for $\phi=1.0$ when the pre-chamber $\phi$ was varied from 0.6 to 1.5.
- Representative time accurate 3D numerical simulations of torch jet mixing predict the penetration of the jet reasonably well.
- Analyze the equivalence ratios and temperatures in the vicinity of ignition.
- Ignitability and ignition delay times depend on the specific nozzle, chamber geometry, and operating conditions of the combustion torch jet.