SAND2017-12801C

Coupling SNL Solvers: CTH+Tiger+SIERRA/Fuego, SIERRA/Aria+Fuego

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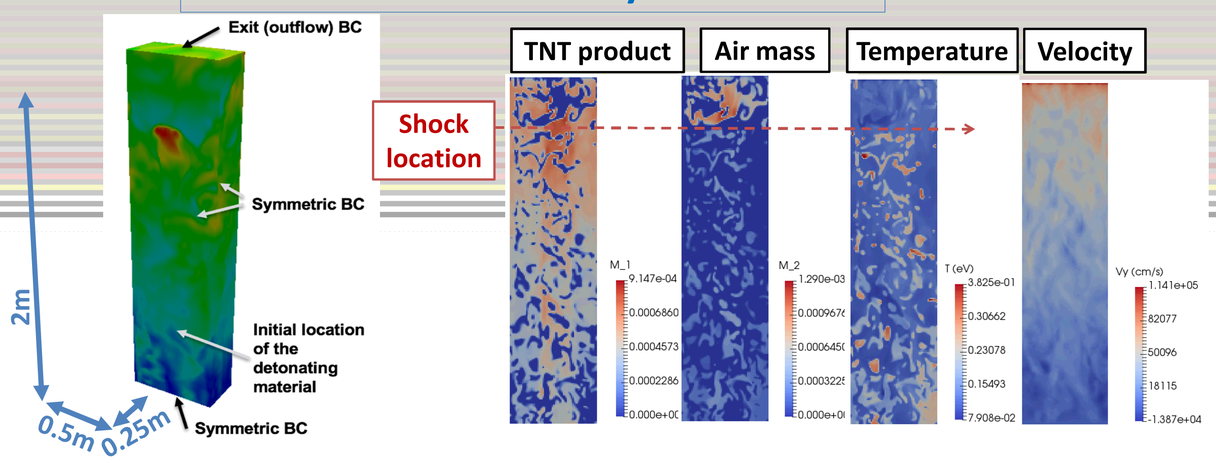
SIERRA/Fuego: A low-Ma turbulent combusting flow solver
Under the SIERRA code suite, Fuego has a great potential to be coupled with other SNL codes

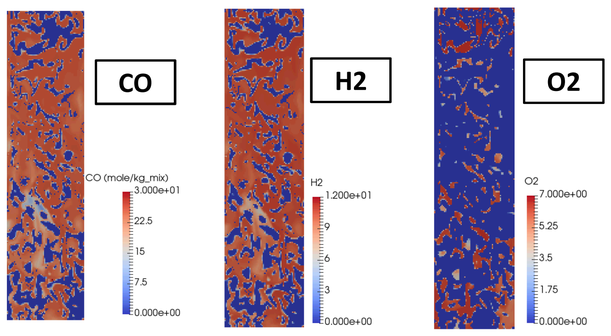
CTH + Tiger + SIERRA/Fuego

CTH: A shock physics, detonation solver
- Superior predictability on post-detonation transportation and wave propagation
- Lacks mixing, post-detonation combustion

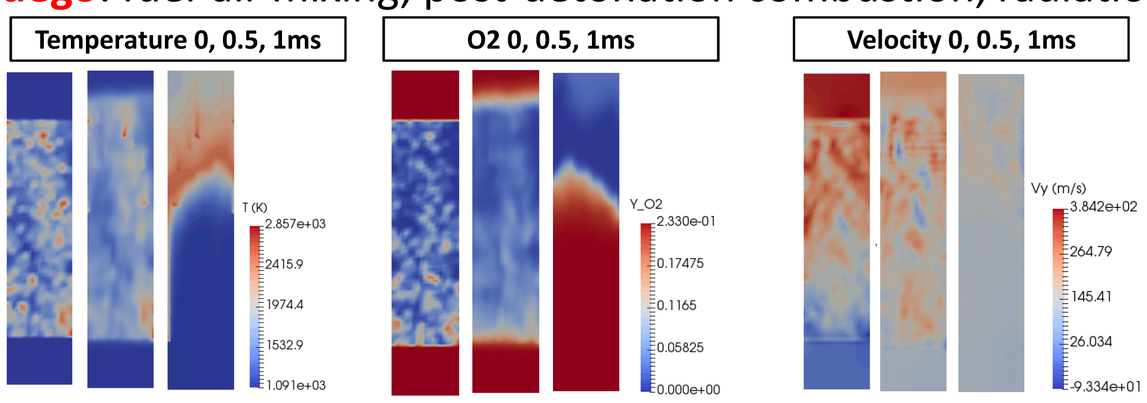
Detonation simulation by CTH for 2ms



Tiger: Computes equilibrium gas composition
- Highly explosive + air → CO, H2, O2, …



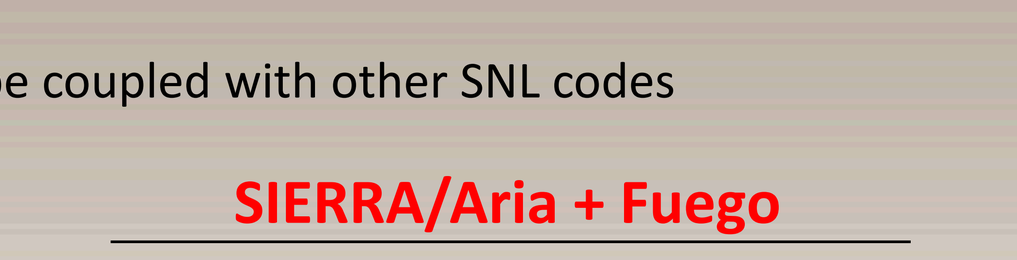
Fuego: fuel-air mixing, post-detonation combustion, radiation



- **Successfully performed CTH → Tiger → Fuego coupling** such that Tiger post-processed CTH result is used as Fuego IC
- Tools were made for exodus-Tiger, element to nodal variable conversion, along with a Fuego code development work

SIERRA/Aria + Fuego

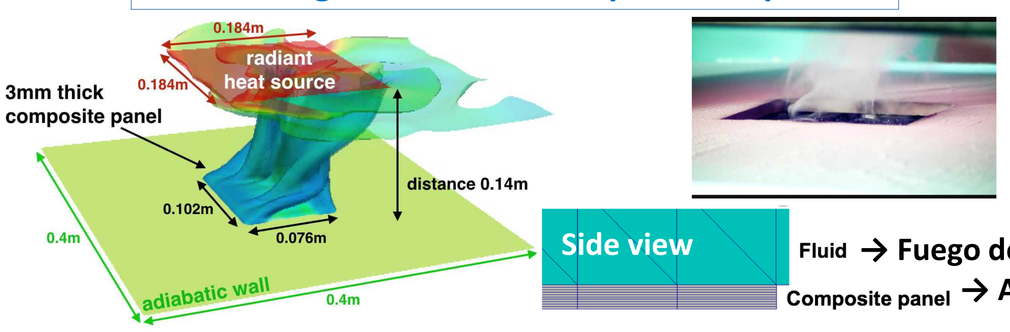
Carbon-fiber epoxy structure and the gasification mechanism



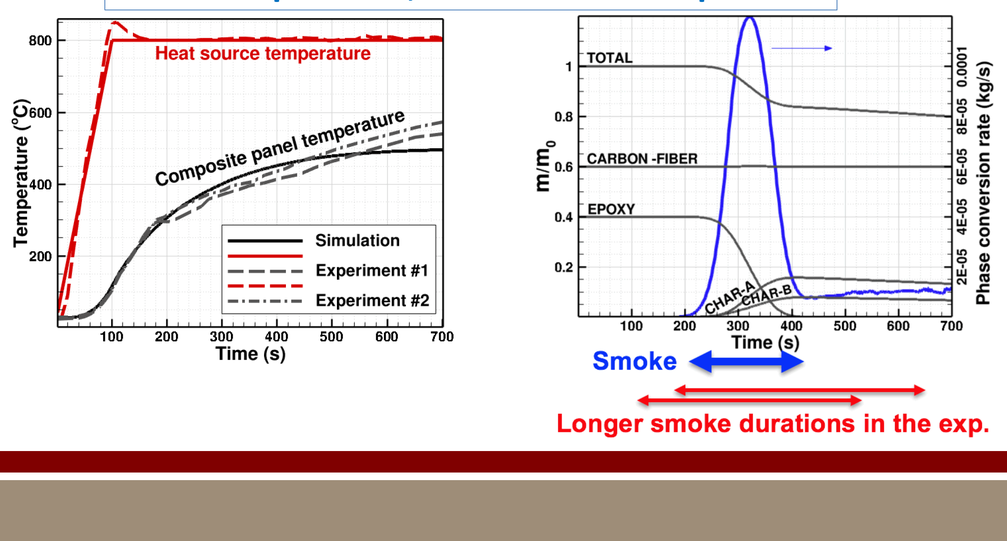
TGA simulation using Fuego follows experiment mass conversion

Radiant heat panel experiment: Aria-Fuego coupled approach predicts temperature correctly

Panel configuration and an experiment picture



Panel temperature, mass conversion profiles



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