Integrated Nozzle Flow, Spray, Combustion, and Emission Modeling

Using KH-ACT Primary Breakup Model & Detailed Chemistry

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Sponsor: DOE Vehicle Technologies Program Office

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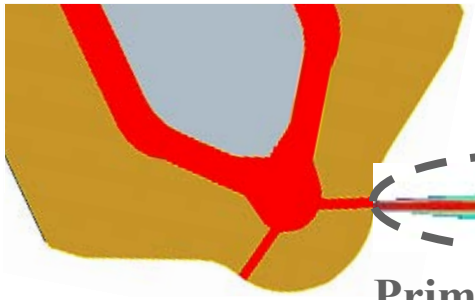
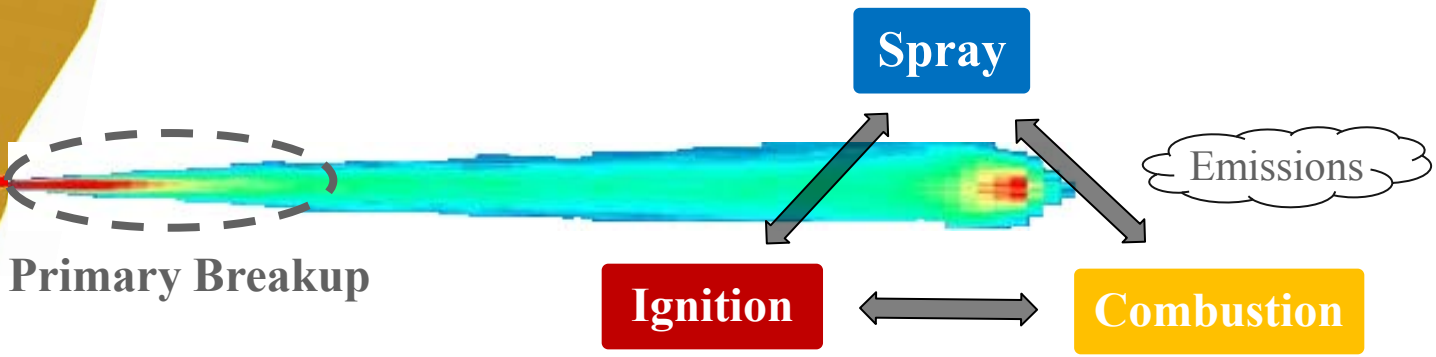
Petrodiesel vs. Biodiesel

Inner Nozzle Flow

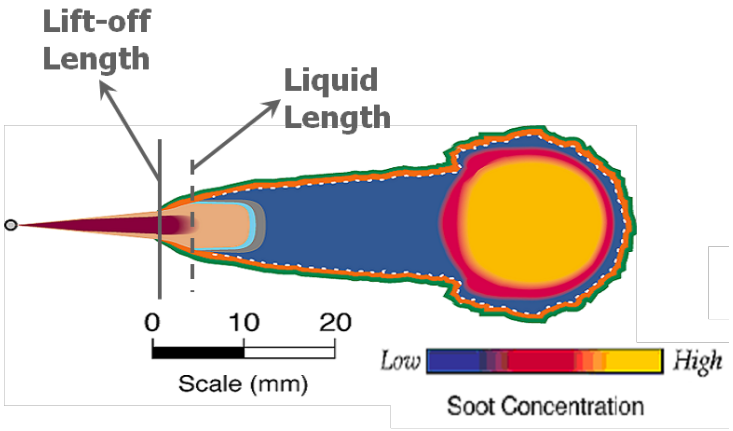


Primary Breakup

Influence of Physical and Chemical properties of fuel



Conceptual Combustion Model from Sandia National Laboratory



- **KH-ACT** primary breakup model: Aerodynamics, Cavitation, Turbulence
- Validation against **x-ray radiography** data
- **Detailed Chemistry**:
  - n-heptane : **Diesel surrogate**
  - Methyl Butanoate } **Biodiesel**
  - **Methyl Decanoate** } **Surrogate**
- Validation against **flame lift-off** data
- Poorer atomization characteristics for biodiesel
- Spray - flame interaction
- NOx vs. Soot trade-off

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