

SUPDET 2012

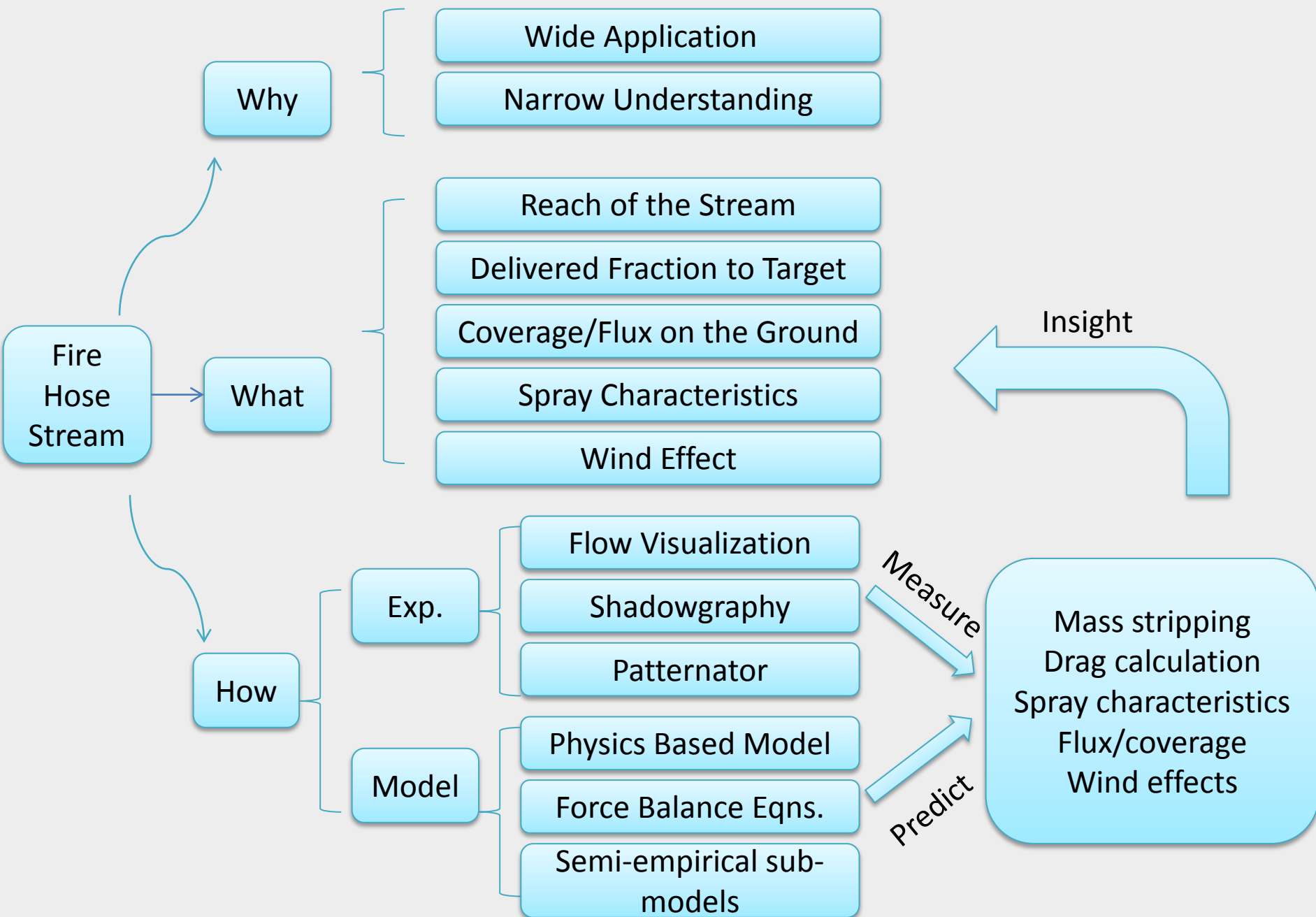
---

# Quantifying Sprays from Fire Hose Streams

---

Yinghui Zheng

March 2012

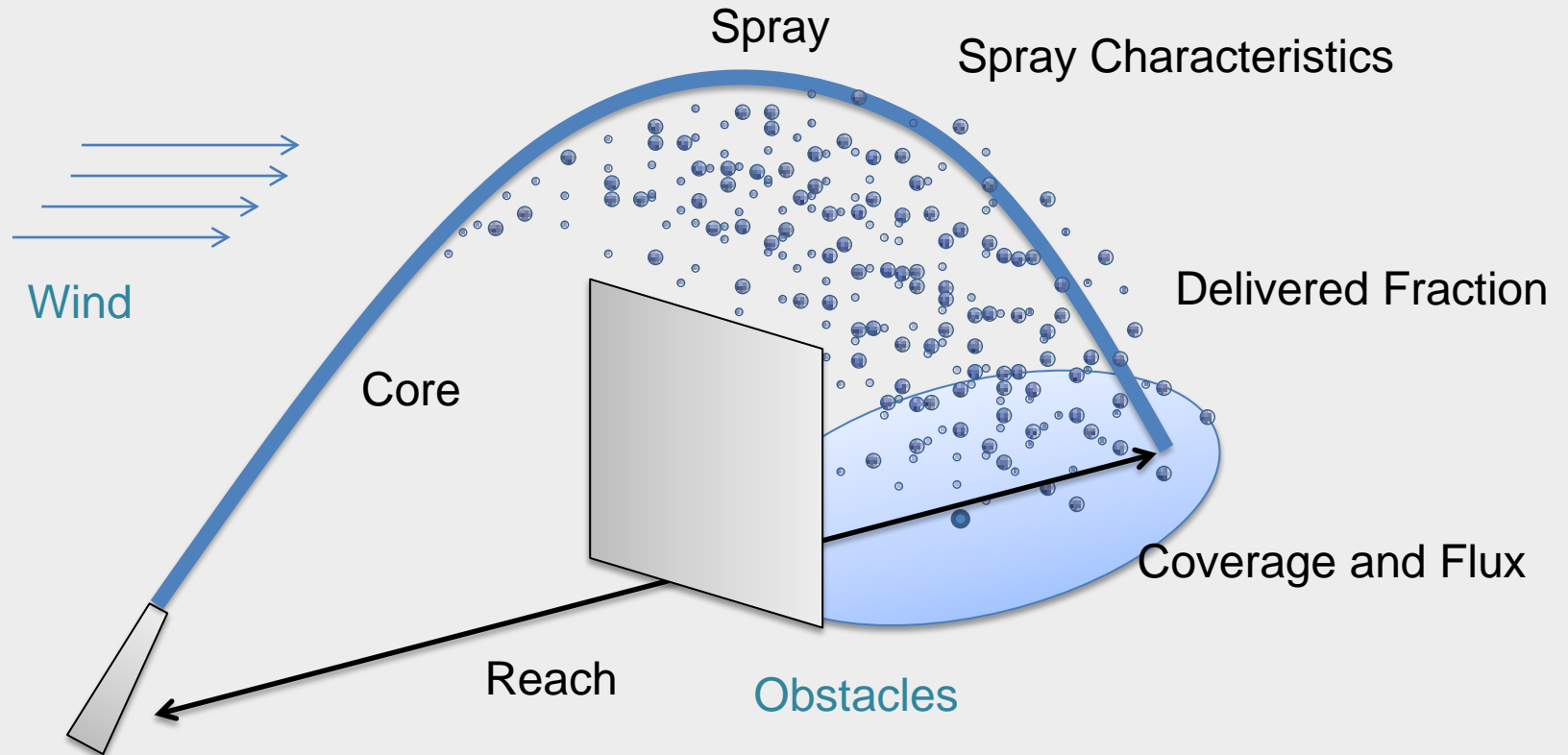


# Background

- Long History
- Wide Application
  - Building fires
  - Wild fires
  - Oil refinery protection
  - Ship/Offshore drilling fires

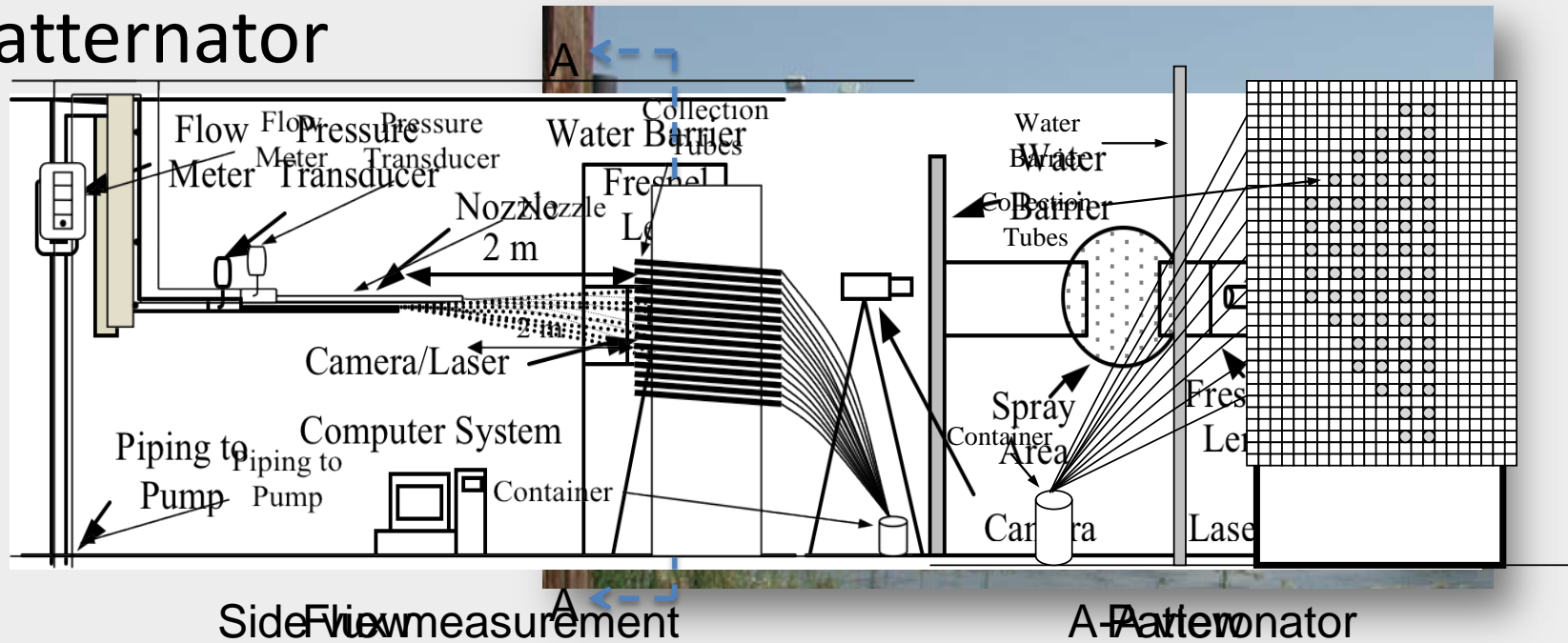
- Nozzle Type
  - Smoothbore nozzle
  - Fog nozzle
  - Master nozzle
- Code Requirement
  - NFPA 1964: Standard for Spray Nozzles, 2008
  - Fire hose testing standard operating guideline, 2007

# Objectives



# Experiment Methods

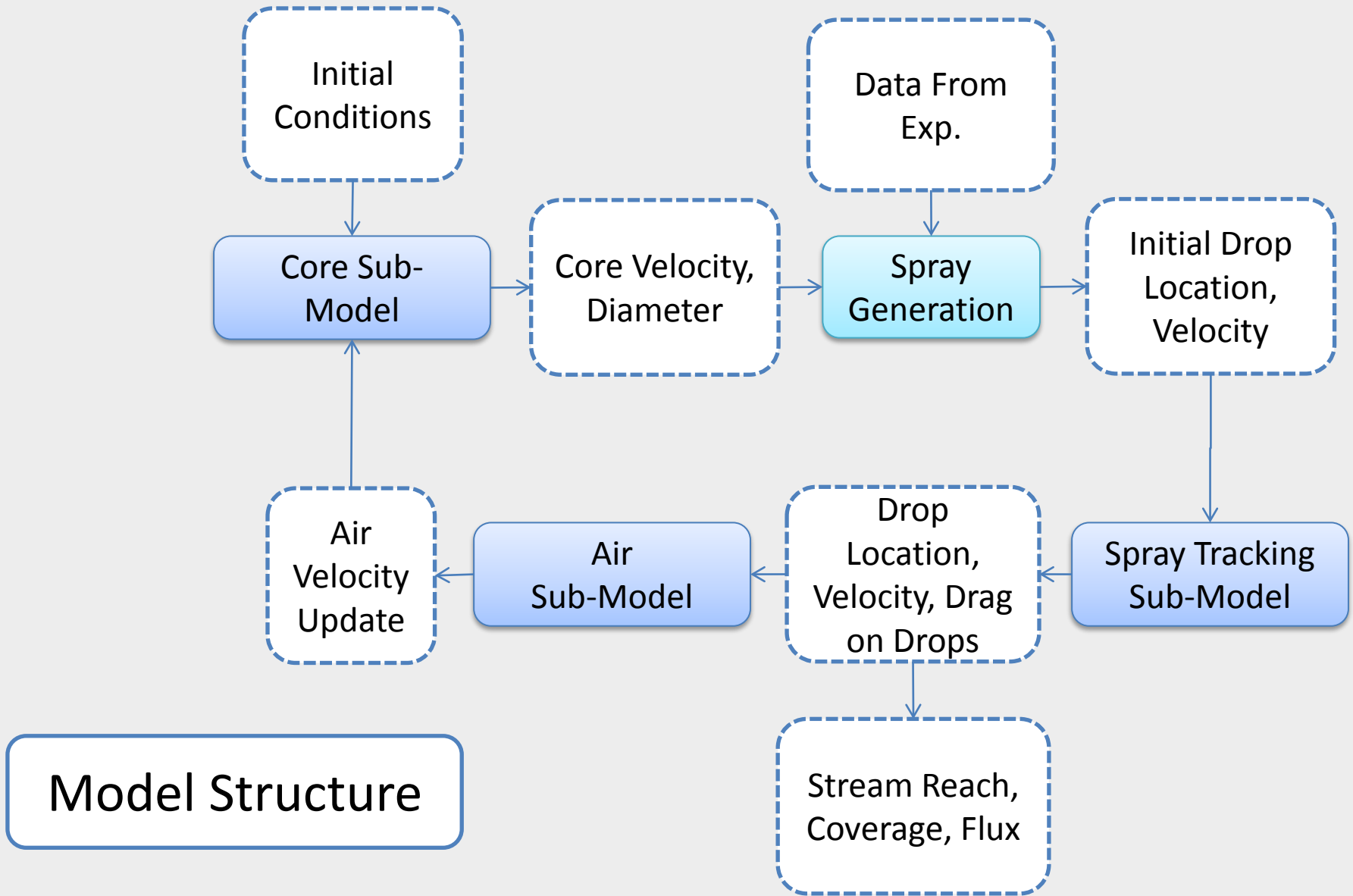
- Flow visualization
- Shadowgraphy
- Patternator



# Physics Based Models (PBM)

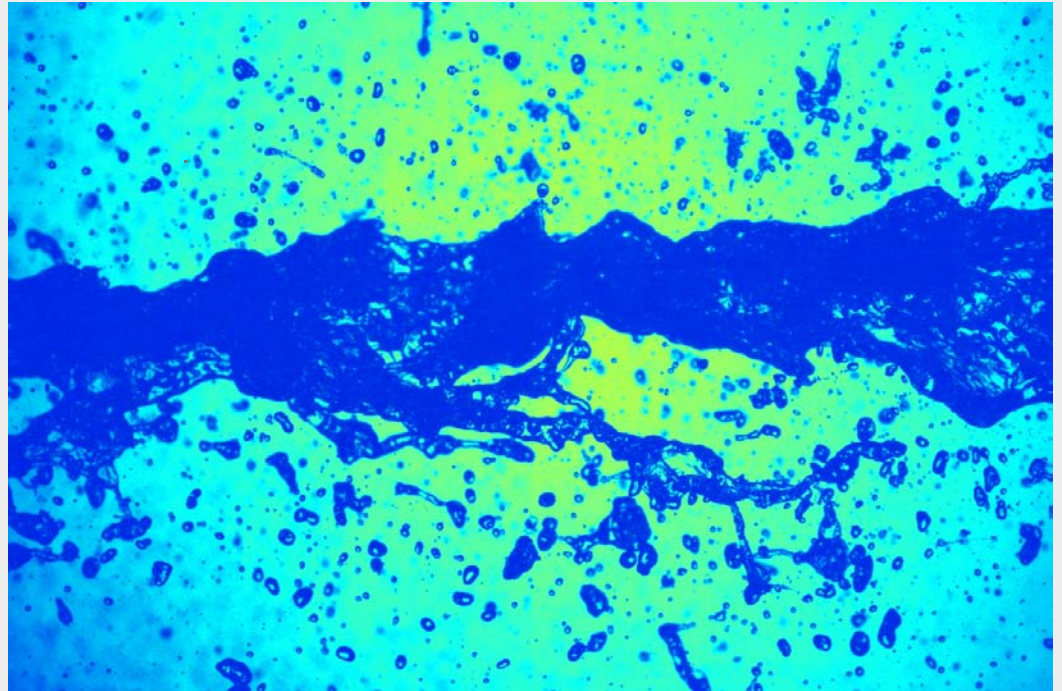
---

- Based on integral force balance analysis resolving streamwise evolution of the spray
- Why physics based model
  - **PBM fast** compared to CFD with large grids and associated long computational time
  - **PBM real time capability** which would not be possible with CFD
  - **PBM coupling capability** which could track the solid core and spray simultaneously



# Preliminary Results

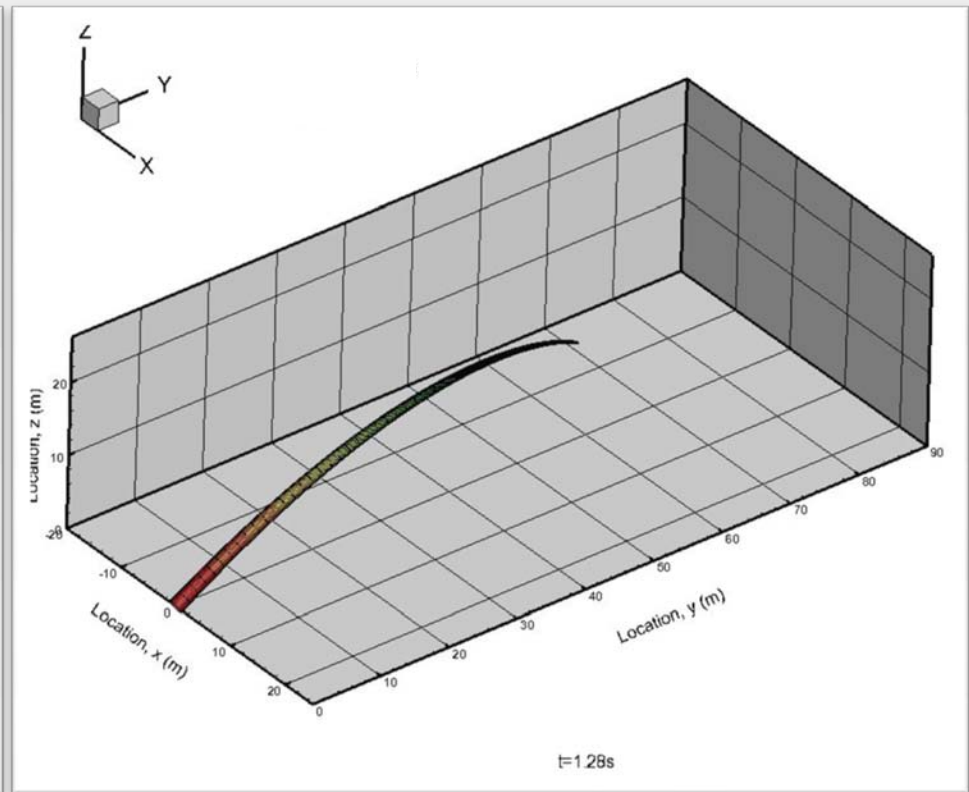
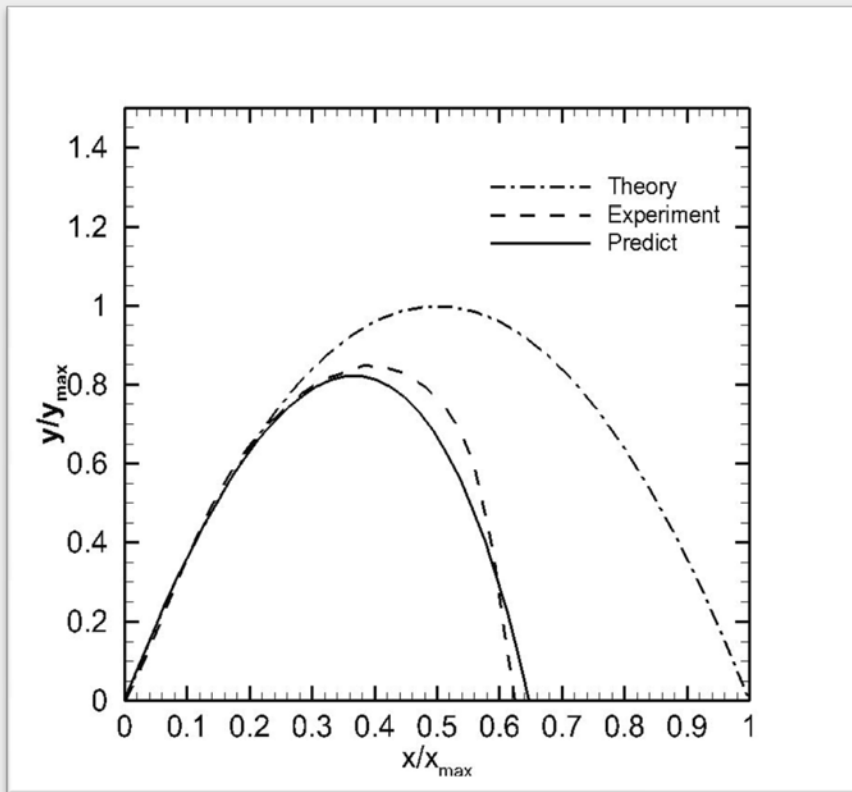
- Spray Measurements
  - ½ in nozzle diameter
  - 55 GPM
    - X=0
    - X=76 cm
    - X=180 cm





# Preliminary Results

- Trajectory Calculation



# Preliminary Results

- Spray Calculation
  - Drop size distribution
  - Drop velocity
  - Drop location
  - Coverage on the ground
  - Percentage delivered

