

# Verification of water droplet transport in the Fire Dynamics Simulator

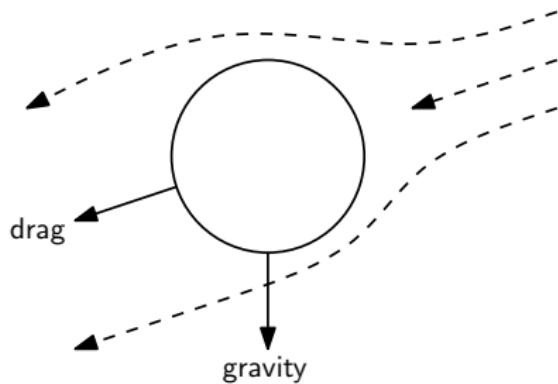
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## Lagrangian particles from a sprinkler

## Particle drag model basics



$$m_p \frac{d\mathbf{u}_p}{dt} = \underbrace{-\frac{1}{2} \rho_a C_{d,p} A_p (\mathbf{u}_p - \mathbf{U}_p) ||\mathbf{u}_p - \mathbf{U}_p||}_{\text{drag}} + \underbrace{m_p \mathbf{g}}_{\text{gravity}}$$

$$\frac{\partial \mathbf{U}}{\partial t} - \mathbf{U} \times \boldsymbol{\omega} + \nabla \mathcal{H} - \tilde{p} \nabla \left( \frac{1}{\rho} \right) = \frac{1}{\rho} \left[ (\rho - \rho_0) \mathbf{g} + \underbrace{\mathbf{f}_b}_{\substack{\text{drag force} \\ \text{per volume}}} + \nabla \cdot \boldsymbol{\tau} \right]$$

Solution is not independent of the angle of the spray with the grid

