

## **A Spray Interaction Model with Application to Surface Film Wetting**

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### **Abstract**

In a fire suppression environment, sprinkler spray wets solid surfaces via droplet impingement. A framework for modeling the interaction of sprays with solid surfaces, with the intention of simulating fire suppression, has been developed. The spray interaction model includes impingement, splashing, and subsequent liquid-film transport over solid surfaces. The thin film-transport equations for mass continuity, momentum, and energy form the basis for the spray-film interaction model. The model has been implemented in OpenFOAM<sup>®†</sup> and subsequently coupled with a fire growth model (FireFOAM). Experimental measurements of splashing behavior are shown and used for model validation. Model validation is demonstrated for droplets impinging on wet corrugated cardboard surfaces over a range of Weber numbers. Comparisons include the splashed mass measured as a function of radial distance from the initial impingement location.

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