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Experimental & Numerical Modeling of Non-combusting Model Firebrands' Transport[1] ALI TOHIDI, University of Maryland College Park, NIGEL KAYE, Clemson University — Fire spotting is one of the major mechanisms of wildfire spread. Three phases of this phenomenon are firebrand formation and break-off from burning vegetation, lofting and downwind transport of firebrands through the velocity field of the wildfire, and spot fire ignition upon landing. The lofting and downwind transport phase is modeled by conducting large-scale wind tunnel experiments. Non-combusting rod-like model firebrands with different aspect ratios are released within the velocity field of a jet in a boundary layer cross-flow that approximates the wildfire velocity field. Characteristics of the firebrand dispersion are quantified by capturing the full trajectory of the model firebrands using the developed image processing algorithm. The results show that the lofting height has a direct impact on the maximum travel distance of the model firebrands. Also, the experimental results are utilized for validation of a highly scalable coupled stochastic & parametric firebrand flight model that, couples the LES-resolved velocity field of a jet-in-nonuniform-cross-flow (JINCF) with a 3D fully deterministic 6-degrees-of-freedom debris transport model. The validation results show that the developed numerical model is capable of estimating average statistics of the firebrands' flight.

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