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Investigating Conifer Tree Flame Spread Under an Applied Wind Field

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DRAFT

Abstract

The large outdoor fire problem is a global issue that shows no signs of stopping in the future. The most well-known type of large outdoor fires are wildland fires that spread into developed, urban areas, known as wildland-urban interface (WUI) fires (Manzello et al., 2017). In the USA, the size of areas burned in 2020 is simply staggering. In California, the August Complex fire itself consumed more than 1 million acres (CALFIRE 2021). The lack of physical understanding is a major barrier to developing computational methods to be able to predict and understand how WUI fires spread. In this study, discrete fuel packages, manifested as conifer trees, were spaced apart, and the flame spread processes through these fuel packages were observed under an applied wind field. The experiments were conducted using wind facilities at the National Research Institute of Fire and Disaster (NRIFD) in Japan. Two ignition sources were utilized. The first considered a custom propane burner and the second made use of firebrand showers using a custom firebrand generator (NIST Dragon). During the subsequent flame spread processes through the discrete fuel packages, heat flux profiles, mass loss profiles, and attendant firebrand production was quantified. Results of this study will be presented.

Keywords: Firebrands, Wildland-Urban Interface (WUI) Fires, Flame Spread Processes

References

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