

Urban-Wildland Fires: On the Ignition of Fuel Beds by Firebrands

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ABSTRACT

Urban-wildland fires have plagued the United States for centuries. Recent urban-wildland fires include the 2002 Hayman Fire, the 2000 Los Alamos Fire, and the 1991 Oakland Hills Fire [1]. Fires in the urban wildland interface can have a devastating effect on human life, property loss, and local economies.

Embers or firebrands are produced as trees and other objects burn in urban-wildland fires. These firebrands are entrained in the atmosphere and may be carried by winds over long distances. Hot firebrands ultimately come to rest and may ignite fuels far removed from the fire, resulting in fire spread. This process is commonly referred to as spotting. Understanding how these hot firebrands can ignite surrounding fuels is an important consideration in mitigating fire spread in communities.

A major advance in urban-wildland fire research would be the development of a model to predict the ignitability of materials due to firebrand impact [2]. The lack of a detailed theory on the ability of firebrands to ignite remote objects limits the utility of detailed computational fluid dynamic models (CFD) that could be used to predict fire spread by firebrands [2]. Detailed experimental ignition studies of fuel beds typically found in the urban-wildland interface due to firebrand impact are required to validate such models.

Consequently, an experimental apparatus has been built to investigate the ignition of fuel beds as a result of impact with burning firebrands. The apparatus allowed for the ignition and deposition of firebrands onto the target fuel bed. The moisture content of the fuel beds used was varied and the fuels considered were pine needle beds and shredded paper beds. Pine needle beds were intended to simulate gutters filled with pine needles. Shredded paper beds were used as a surrogate for typical cellulosic fuels that would be found in attic spaces. Firebrands were simulated by machining wood (*pinus ponderosa*) into small disks of uniform geometry. The firebrand ignition apparatus was installed into the Fire Emulator/Detector Evaluator (FE/DE) to investigate the influence of an air flow on the ignition propensity of fuel beds. Results of this study are presented.

KEYWORDS: firebrands, urban-wildland fires, ignition

REFERENCES

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- [2] Babrauskas, V., Ignition Handbook, Chapters 11&14, Fire Science Publishers, Issaquah, WA, 2003.