

Modelling of Wildland-Urban-Interface wind-driven fires with slope effects

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Abstract

Recently, a new framework for modelling fires in terrains with strong inhomogeneities, such as those in the Wildland-Urban-Interface (WUI), has been proposed [1,2]. It has been applied so far to fires in flat terrains and fires that are propagating by firebrands. The model gives good predictions of the fire scar (the outline of the burnt region) and offers high-resolution information on the burn probability.

In this paper, the model is further used for two fires in Athens suburbs, in June and July 2022. One of these was going upslope, the other downslope, and both were at the interface between the built space and wildland with shrubs and low trees. The model's parameters were estimated for these situations and the inclination angle was included explicitly, based on previous CFD results [3]. The model gave fairly good predictions of the overall fire behaviour.

In the final poster, the results will be presented in detail, links to movies will be given, and a discussion on the model's strengths and weaknesses will be included.

1. Mastorakos, E., Gkantonas, S., Efstathiou, G. & Giusti, A. (2022) A hybrid stochastic Lagrangian - cellular automata framework for modelling fire propagation in inhomogeneous terrains. To appear in *Proceedings of the Combustion Institute* **39**. <https://doi.org/10.1016/j.proci.2022.07.240>
2. Efstathiou, G., Gkantonas, S., Giusti, A., Mastorakos, E., Foale, C.M. & Foale, R.R. (2023) Simulation of the December 2021 Marshall fire with a hybrid stochastic Lagrangian-cellular automata model. *Fire Safety Journal* **138**, 103795. <https://doi.org/10.1016/j.firesaf.2023.103795>
3. Eftekharian, E. et al. (2019) Investigation of terrain slope effects on wind enhancement by a line source fire. *Case Studies in Thermal Engineering* **14**. 100467. <https://doi.org/10.1016/j.csite.2019.100467>