

Mathematics for Urban and Forest Fires

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The role of advanced fire behaviour models supported by AI to predict fire spread and aid in the decision making process during a wildfire

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Wildfire Decision Support Systems (DSS) are critical tools for authorities in the management of all wildfire stages. They enable the identification of fire-prone areas through fire-risk assessment, allowing to timely act and apply the necessary preventive measures. During a wildfire, DSS can be used to predict the fire spread, allowing the planning and pre-positioning of the firefighting teams, the evacuation of the population and closing of roads and railways, and the activation of backup systems for affected infrastructures (energy, water, communications, and transportation). Furthermore, fire behaviour simulation tools can also be used to predict the effectiveness of fire suppression actions, to better coordinate and plan such efforts. This talk will be dedicated to the recent advances in fire behaviour simulation, including novel fire propagation models, which are the backbone of any wildfire DSS and can help to better understand extreme fire events. The role of AI will also be discussed as a critical tool to further increase simulation's accuracy. This research work is done within the national FCT research project IMfire, ref. PCIF/SSI/0151/2018.