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## Modelling emergency evacuation from an industrial building under spreading fire using a social force model with fire dynamics

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### Abstract

Study of human evacuation from industrial buildings under spreading fire is a challenging research area. Modelling evacuation dynamics under spreading fire is crucial to evaluate the crowd risk and safety in emergency evacuation. The paper presents a crowd dynamics model for emergency evacuation from an industrial building under spreading fire. This model is formulated by integrating a social force model with fire dynamics to investigate the evacuation process under spreading fire. The evacuation model was implemented in MATLAB to simulate the human dynamics for evacuation from a large single-story building under fire with a single exit door. The test results demonstrate that the overall evacuation time was affected by numerous factors for instance: fire spreading rate, crowd density and exit-width. The proposed model can be used to simulate the efficiency of the evacuation process from an industrial building, and thus, it can enhance the design of industries to increase the safety level.

*Keywords: Crowd Dynamics, Emergency Evacuation, Social Force Model, Fire Dynamics, Industry Building;*

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