

A BIM Based Simulation Framework for Fire Evacuation Planning

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Abstract

This study implements Building Information Modeling (BIM) for conducting a simulation design involving the technologies of Fire Dynamics Simulator (FDS) and Agent Based Modeling (ABM) to foresee the relationship between evacuator's mortality and building layout design. The goals of this paper are to investigate (1) how to predict the building's Available Safe Egress Time (ASET) by using FDS software; (2) how to reflect the evacuation behavior within an ABM simulation; (3) how would the Required Safe Egress Time (RSET) be impacted by the building properties, fire properties, and human behavior. By making a comparison between ASET and RSET, the optimized building layout design that reflects minimum RSET can be chosen. And finally, BIM serves as the environment to visualize the results of (1) the hazardous zones that reflected in the fire simulation; (2) the effective escape routes that are recommended by the evacuation scenario. These results can be used to improve fire safety management for both fire education and construction design. Following the results, this paper concludes with a description of challenges associated with building fire and agent-based evacuation simulations that would arise from developing a BIM-based framework for highly occupied building fires.

Keywords

Fire safety management Building information modeling (BIM)

Fire dynamic simulator (FDS) Agent-based modeling (ABM)

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