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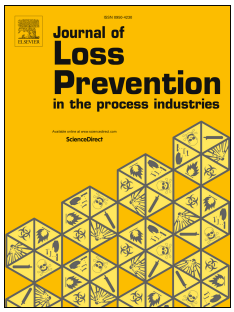

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How to address model uncertainty in the escalation of domino effects?

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Abstract

Modeling potential domino scenarios in process plants includes the prediction of the most probable sequence of events and the calculation of respective probabilities, so-called escalation probabilities, so that appropriate prevention and mitigation safety measures can be devised. Domino effect modeling, however, is very challenging mainly due to uncertainties involved in estimation of escalation probabilities (parameter uncertainty) and prediction of the sequence of events during a domino effect (model uncertainty). In the present study, a methodology based on dynamic Bayesian network is developed for identification of the most likely sequence of events in domino scenarios while accounting for model uncertainty. Verifying the accuracy of the methodology based on a comparison with previous studies, the methodology is applied to model single-primary-event and multiple-primary-event domino scenarios in process plants.

Keywords: Domino effect; Oil terminal; Dynamic Bayesian network; Model uncertainty; Graph theory.