**ABSTRACT**

**Cumulative Effects of Chemical Spills Using A Spital-temporal Dynamics Analysis Algorithm**

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The increasing number of accidents involving chemical spills demands development of not only feasible emergency strategies, but also a consistent framework to protect the environment and prevent accidents. This can be possible only by a sound understanding of the environmental impact of spills and their potential long-term effects. Furthermore, the impact assessment of chemical spills cannot be done disregarding the spatial-temproal pattern of previous exposures reciprocally influenced by both chemical and environmental properties.

In this context, the thesis proposes a general framework to quantify the cumulative effects of chemical spills at any given point of a certain area based on a "present" history of exposure coupled with chemical and environmental properties designated as relevant to predict possible pictures of future exposure and estimate in advance potential alarming levels of pollution. To achieve this purpose, the following objectives are set up. The first objective is to develop a four-dimensional model to simulate a single-spill event based on certain assumptions about chemical and soil characteristics. The second objective is to develop an algorithm to assess the cumulative effects of chemical spills on a selected area using the model for a single-spill event while taking into account the effects of those spills of the spatial-temporal zone adjacent to the study area.