



Flood Risk Analysis in Underground Spaces by Using Inundation Information in Urban Area

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Urban flood in underground spaces is very important since it can cause unexpected property and life damages. Recent torrential rainfall and rapid development of underground areas such as subways, underground roads/shops and electric facilities have large vulnerability to flood inundations.

The study of flood risk in underground space is conducted based on database of flood hazard information. For this purpose, the analysis of flood prediction was carried out through flood risk assessment and the amount of inflows into the underground space which were calculated by numerical and empirical methods.

The modeling procedure are established by using @RISK program. The major variables such as rainfall events, flood depth in surface, topographic data with high-resolution were defined and simulations were conducted to analyze the risk of underground inundation. The simulation method can be set up as either Monte Carlo simulation method or Latin Hypercube simulation method. Monte Carlo simulation method was used and the number of iterations was set to 1,000 in this study.

The model was applied to Gangnam area in Seoul city, which suffered from severe flood disasters during 2010-2012. Flood inundation analyses are performed in overland and underground spaces and the risks of flood inflow into the underground spaces are estimated by Monte Carlo simulation at major sites such as entrances of subways and underground spaces. The methodologies presented in this study will contribute to know the risk of inundations in urban areas and underground spaces.

Keywords: Flood in underground; Flood risk analysis; Monte Carlo simulation

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