# DEVELOPMENT OF A FLOOD RUNOFF AND INUNDATION ANALYSIS SYSTEM USING 2-D RAINFALL DATA

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The climatic change of summer rainfall pattern in Korean peninsula can be summarized as the total number of rain day decreases, nevertheless, the total amount of rainfall increases, and the total number of days, whose daily rainfall amount is greater than 80 mm, increases (Kim and Yim, 2005). Floods are the most frequent natural hazards in Korea: typhoon Rusa took 213 lives and caused $5 billion worth of damage in 2002, and typhoon Memi took 117 lives and caused $4.5 billion worth of damage in 2003 (www.kma.go.kr). To evaluate the probable flooding damages, we need an accurate numerical model for flood and inundation analysis as well as accurate spatial rainfall estimation technique. Therefore a comprehensive approach is essential to analyze the flood and inundation effectively.

The analysis of flood wave resulting by the sudden collapse of a dam or river levee is studied continuously after development of a set of hyperbolic partial differential equations, well known as Saint-Venant equations. Katopodes and Strelkoff (1978) developed two-dimensional numerical model using characteristic curves but it is relatively complex to use. Kawata and Nakagawa (1984) and Tachi et al.(2001) represented the relationships between flood waves and obstacles in protected lowlands such as buildings, trees etc. Han et al.(1998, 2003, 2004) analyzed the characteristics of flood waves in protected low lands caused by levee breaks. In this study, a 2-D flood inundation model was developed to evaluate the impact of levee failure in a natural basin for flood analysis.

The variability of rainfall has the most critical influence on the performance of hydrologic models. Traditionally, hydrologic models have depended on rain gauge networks to provide the areal-averaged rainfall information. It will provides incorrect representation of the spatial characteristics of rainfall fields, especially in convective weather systems where rainfall amounts vary significantly over small regions. Therefore accurate spatial rainfall information is essential to analyze the rainfall runoff process appropriately. In this study, we introduced an ordinary cokriging technique which optimally merges radar reflectivity data into rain-gauges data (Krajewski, 1987). Finally the advanced spatial rainfall estimation technique and flood inundation analysis model

were integrated to simulate two-dimensional surface flow during severe floods.

The model was applied to analyze the inundation flow from the levee break of Gamcheon river during the typhoon Rusa on October 31 through September 1, 2002. To verify the simulated results, wide range field surveys have been performed including the collection of NGIS database, land use condition, flooded area, and flow depths. Overall results have good agreements with the observed data in terms of flood level and flooded area. The developed model will contribute to the establishment of the national integrated flood disaster prevention system and the river or protect lowland management system.

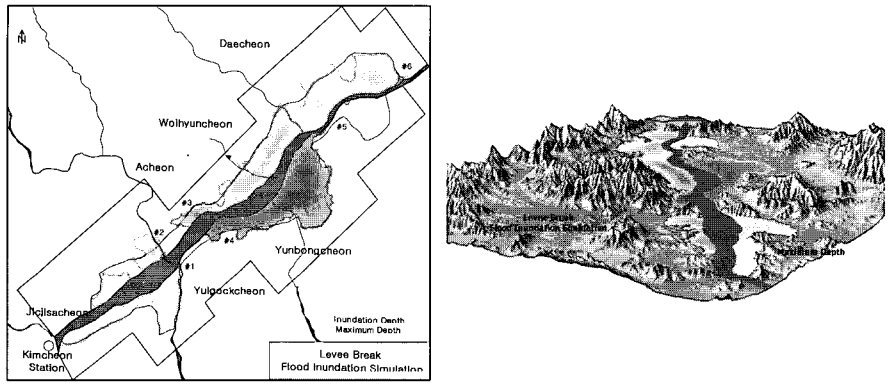


Fig. 1 Observed flooded area (solid line) and the simulated flooded area (shaded area)

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