# Application of 2D-3D Numerical Coupling Model to Inundation Flow Analysis in Urban Area

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Many disasters of river water flooding have occurred all over the world. The structures in a river channel cause water level rise during flood duration. Most of the inundation simulations have been carried out by integrated inundation model or dynamic inundation model. They used 1D or 2D model to simulate the flood flow in a river. However, 1D or 2D calculations are insufficient for evaluation of complicated flow around river structures. Therefore, those computations cause some error in inundation flow analysis considering overflow from a river channel. In order to estimate accurately the inundation flow into a floodplain from a river channel, a 2D-3D numerical coupling model is proposed, which includes horizontal 2D computation in a floodplain and 3D computation with free-surface in a river channel, and applied to an actual urban area. And, the applicability and reproducibility of the proposed model are estimated. The study area is A-river basin in Japan. The A-river has channel length 7.0km, average discharge $0.56 \text{m}^3/\text{s}$ and basin area 8.6km^2. There are four rivers, one reservoir and one dam in A-river basin. The downstream area of the A-river basin is highly urbanized. In the study area, inundation disaster occurred on August 11, 2007. Most part of the urban area was inundated and attacked by heavy rainfall. Especially, regions near the river suffered from severe damages by overflow from the river channel. And, the inundation disaster occurred during repairing work of river channel. Therefore, the numerical simulation is necessary to consider effects of structures. **Fig.1** shows the comparison of numerical results of the previous numerical simulation, and those with and without consideration of repairing work. As shown in the figure, the appearance of propagation of inundation flow is similar among those results although inundation area showed some difference. From the comparison of results with and without consideration of repairing work, it is found that starting point of overflow is the same in both results. And, it is judged that the effect of water level rise by river structures is not large. The results obtained from the simulation have generally good agreements in the viewpoint of flood propagation.

previous numerical simulation   not considering repairing work   considering repairing work
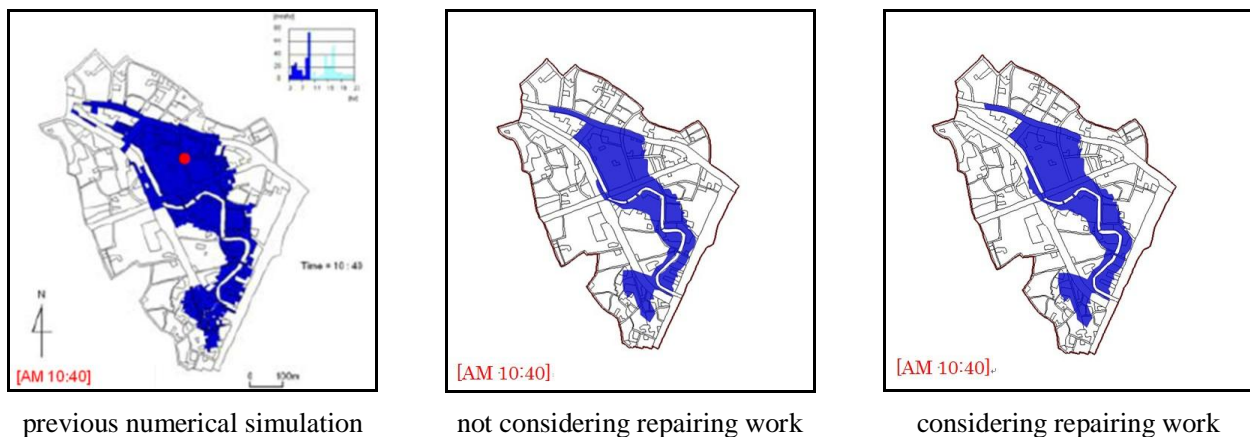
Fig.1 Comparison of numerical results (AM 10:40)