

Multi-agent based flood evacuation simulation models considering the effect of congestion and obstructions on the pathway

K. HANAJIMA¹, M. NAKASHIMA², T. HORI³ & D. NOHARA³

1 Graduate School of Engineering, Kyoto University, 611-0011 Kyoto, Japan
hanajima.kengo.27a@st.kyoto-u.ac.jp

2 Faculty of Engineering, Kyoto University, 611-0011 Kyoto, Japan

3 Disaster Prevention Research Institute, Kyoto University, 611-0011 Kyoto, Japan

Abstract In flood hazardous situations the effect of congestion and obstructions on people's walking speed may be crucial in the evacuation process, especially in urbanized areas. In order to simulate these situations, node and arc expression of the street network is not enough because this kind of one dimensional expression cannot deal with the actions of passing and avoiding the other evacuees. In this study, two types of evacuation simulation models, which express the streets as a sequence of rectangles, were developed and tested. One uses the experimental relation between crowd density and walking speed. The other uses rule-based collision-avoiding actions of evacuees. The performances of those two models have been compared in several simulation results in actual flood-plain areas in Japan.

Key words flood evacuation; evacuation route congestion; flood hazard map; multi-agent systems; urban flood