ABSTRACT

VERIFICATION OF MESH-TYPE FIRE SPREADING SIMULATION SYSTEM FOR EARTHQUAKE EVACUATION PLANNINGS

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We have developed a fire spreading simulation system based on Hamada-type empirical formula of fire-spreading velocity. It is a mesh-type, visual simulation and can deal with simultaneous outbreaks of fire. In this paper, we try to verify it as an evacuation planning information system for strong quakes.

First, we study its reproductivity to real conflagrations and demonstrate that

1° In the case of Fukumitsu Big Fire, although it has a tendency of over-burnings for the leeward and sideward and underburnings for the windward, it shows a good reproductivity of the 40 minutes later result.

2° In the Sakata case, it shows underburnings until 60 minutes and changes overburnings after that. But the gap between the real and simulational ones is getting small and becomes null at 240 minutes later.

Secondary, we discuss effects of factors which determine the output of the system. We pick up six factors; WD (Wind Direction), WV (Wind Velocity), R (Ratio of land covering), P (Percentage of wooden buildings), β (Percentage of fire-proof wooden), and M (Mesh map), and set two levels for each of them. Using $L_{16}(2^{15})$ table of the orthogonal arrays, we design a series of experiments of simulation and do the covariance analysis. The results are

3° P is the most crucial and has 48.5% contribution. M is the second and 41.6% contribution.

4° WV is the 3rd and has 6.1%, but only significant at the 5% level.

5° WD, R, and β are not significant even at the 5% level.