EVALUATION OF ROOF COLLAPSE BEHAVIOR OF PIPE-FRAMED GREENHOUSES UNDER SNOW LOAD AND THE SNOW LOAD CARRYING CAPACITY OF THE STRENGTHEN FRAMES

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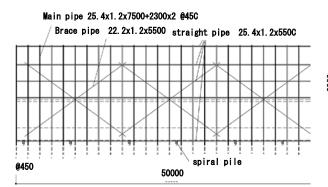
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Keywords: pipe-framed greenhouses, snow load carrying capacity, strengthen frames

ABSTRACT

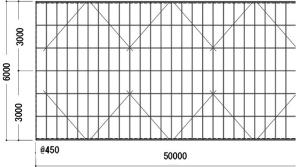
The purpose of this study is to investigate the collapse behavior of pipeframed greenhouses (Fig.1,2,3) subjected to snow load and the snow resistance performance of the strengthen frame (Fig.6). The snow load distributions (Fig.4,6) for a structural safety design of pipe houses are proposed based on field observations in a mountain (Fig.6). The experiments (Fig.5) of a pipe house subjected to sand bags are carried out to investigate the deformation and the load-carrying capacity.













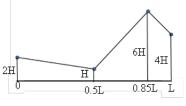


Fig.4. Proposed design snow load distribution

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The elasto-plastic and linear buckling analyses are also carried out to verify the analysis modeling and evaluate the load-carrying capacity of the pipe house (Fig.8).

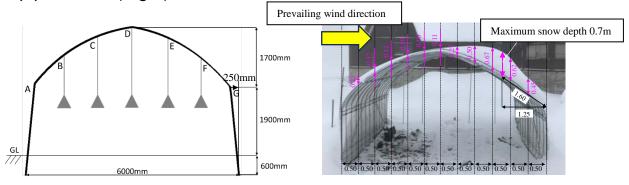


Fig. 5. Elevation and load carrying test

Fig.6. Snow cover distribution (Unit: m)

Several strengthen frames are proposed and discussed in regards with the effect of the strengthening members on improving of the load-carrying performance. The elasto-plastic analyses show good agreement with the experiments. The highly efficient locations of the strengthening members are presented for improving the resistance capacity of the pipe house subjected to snow load (Fig.7,9).

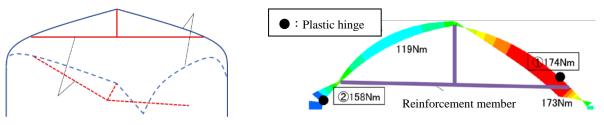


Fig.7. Collapsed frame due to snow load



Fig.8. Bending moment of its frame



Fig.9. Collapse greenhouse due to snow load

REFERENCE

[1] H. Moriyama, Mears, D. R. Sase S., A. Ikeguchi, T. Yamauchi: *Reinforcement for pipe-framed Greenhouse under snow load and design optimization considering steel mass, J. SASJ, Vol.38, No.4, 2008, s. 263-274.*