

Multiscale Buckling Analyses of Corrugated Fiberboard

Hirohisa Noguchi⁽¹⁾, Nobutada Ohno⁽²⁾, Dai Okumura⁽²⁾

(1) *Dept. of System Design Engineering, Keio University, Yokohama, Japan*

(2) *Dept. of Mechanical Engineering, Nagoya University, Nagoya, Japan*

In this paper, multiscale micro-macro interaction analyses of corrugated fiberboard are conducted by the finite element method in conjunction with the homogenization theory. It is assumed that corrugated fiberboard is piled periodically in quasi three-dimensional state. The updated Lagrangian method is adopted for the geometrically nonlinear analyses of microstructure and the scaled corrector method for detecting the buckling mode. The conclusions obtained in this study are summarized as follows. 1) The large deformation and buckling analysis based on the homogenization theory is conducted and the mechanical properties of corrugated fiberboard are investigated. 2) The micro–macro interaction analysis procedure for the buckling of the corrugated fiberboard based on the homogenization theory is newly proposed. The validity of the proposed procedure is clarified qualitatively by comparing with the experimental results.

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