

# Experiment of bi-axial creep of fabric membranes under cyclic temperature and its formulation of constitutive equation based on Fabric Lattice Model

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## Abstract

Extensional characteristics of PTFE coated glass fiber fabric membranes is a key factor for design. The present authors [1, 2, 3] investigated in the past the elastic-plastic characteristics by experiments under a constant temperature of various values, and the results compatible with the experiments were formulated as general constitutive equations for various stress ratios based on Fabric Lattice Model shown in Figure.1. They have been applied to FEM analyses.

This study presents a set of bi-axial experimental results for creep characteristics under cyclic temperature. The experiments were conducted in the research laboratory of Taiyo Kogyo. The temperature of one cycle is from 20.4°C to 2.8°C. Two stress levels respectively for 3 and 5 kN/m, the experiments are performed in seven cycles as shown in Figure 2. Several typical stress ratios of warp to fill are applied as 1:1, 2:1, 1:2, 1:0, and 0:1. As illustrated for 1:1 stress ratio shown in Figure 2, the effect due to cyclic temperature is found not to be sharp. The results for temperature cycles are then formulated as the constitutive equations for FEM and the validity is to be proved in the final paper.

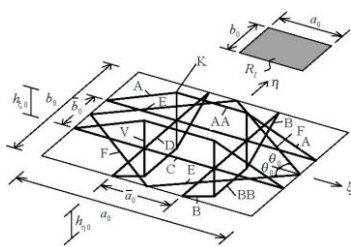


Figure.1 Fabric Lattice Model

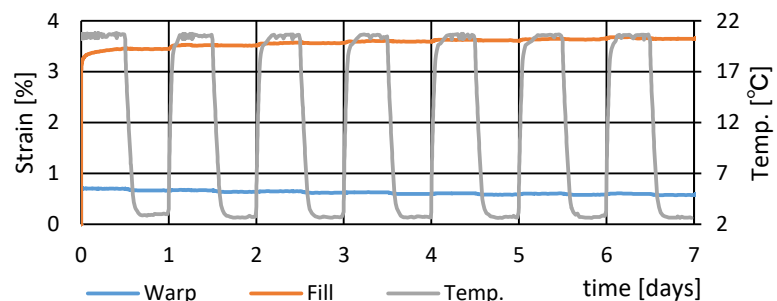


Figure. 2 Test of biaxial creep under stress ratio (1:1) of constant stress 5kN/m for cyclic temperature from 2.8°C to 20.4°C

## References

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