

ABSTRACTS (MASTER THESIS)

**Pretreatment for wood flow forming –
Temporal variability of solution distribution in impregnated wood under conditioning**

(Graduate School of Agriculture,
Laboratory of Sustainable Materials, RISH, Kyoto University)

Masaya Nagai

Introduction

Wood flow forming is a new method in which bulk wood is formed into the product with three dimensional shape. The bulk wood is impregnated with resin for obtaining the stable product. There exists the issue as to the irregular distribution of the resin in cell walls, causing the partial deformation and color change in the product. The impregnated wood is required to be conditioned under controlled atmosphere for promoting the resin diffusion from the cell cavity into the cell walls, leading to the decrease in the irregularity. The solution of the resin should be existed in the cell cavity to cause the diffusion. This has, however, not yet been examined. In this study, the model experiment was performed to understand the flow of the solution distribution in cell cavities during the conditioning.

Figure 1 shows the assumed model of the solution flow in impregnated wood under conditioning. In the model, the solution (liquid phase) is assumed to decrease both from the outside and inside wood. It was, however, difficult to observe directly the solution flow in cell cavities in the impregnated wood. In this study, the PFA micro-tubes are injected with solution and subsequently conditioned to observe the solution flow in impregnated wood, and the flow was predicted.

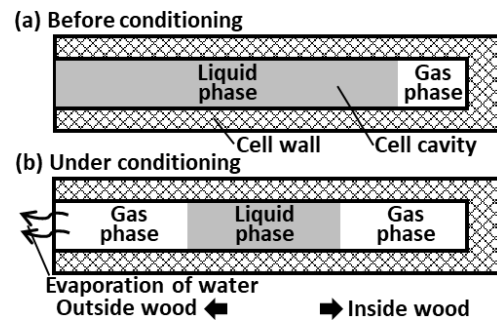


Fig. 1 Predicted solution flow in impregnated wood under conditioning

Materials and methods

Six micro-tubes with 9cm-length and 0.5mm-inner diameter (PFA) were embedded in an acrylic board, and the one side of the tubes were sealed with the adhesive. This preparation is injected with an aqueous solution of patent blue V by vacuuming under a pressure of 3.2kPa, and subsequently by exposing it to an atmosphere. The injected preparations are conditioned under the temperature and relative humidity controlled at several levels. During the conditioning, the picture of the preparation is taken every given times to observe the solution flow in the micro-tubes.

Results and discussion

Figure 2 shows the solution distribution in the micro-tubes under conditioning. The solution was distributed between the opened and closed sides in the micro-tubes, and the distribution varied with evaporation of water. It was also confirmed that the temporal variability of the solution distribution was affected by temperature and RH under the conditioning.



Fig. 2 Solution distribution under conditioning at 74%RH with 60°C
① Gas phase in opened side, ② Solution (Liquid phase), ③ Gas phase in closed side)