

Experimental study on the creep response of Chilean Radiata Pine wood

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Wood has long been an accessible material, at hand for different type of applications. It has recently undergone a renaissance thanks to exceptional properties. For instance, as a renewable material source, it has a small environmental impact, a favorable seismic performance and it can self-protect against fire. In Chile, Radiata pine has been promoted as a construction material to take advantage of its wide availability. In 2017, near the 60% of the total wood exports were of this type of pine. Despite the increasing interest on the material, experimental mechanical properties are scarcely available or not very well known [1]. Macroscopically, a common way to characterize the material is the bending test. Nevertheless, they are often performed at ambient conditions, with humidity and temperature kept constant.

For this reason, the scope of this work is to study the relaxation phenomenon in the Radiata pine under flexion i.e., the decrease of the tension or load over time while keeping a constant deformation rate. The purpose of this research is to determine which factor has a greater influence on the relaxation of the bending behavior. An ambient chamber was designed so to keep the temperature and relative humidity in the inside within a defined range. Bending relaxation tests were carried out on wood specimens inside the chamber. The proposed methodology leads to satisfactory results. It is shown that both the displacement and the humidity play an important role on the relaxation behavior. Temperature, on the other hand, has a negligible effect on the relaxation. Recommendations are indicated for the improvement of the environment chamber.

References

- [1] E. I. Saavedra Flores, R. M. Ajaj, I. Dayyani, Y. Chandra, and R. Das, “Multi-scale model updating for the mechanical properties of cross-laminated timber,” *Comput. Struct.*, vol. 177, pp. 83–90, 2016.