

Abstract

In the field of materials capable to absorb the energy from impacts as cellular materials, we can find wood. On that sense wood is a good option because of his capacity to deform until values between 60% and 80% depending on the specie of wood but using wood has its cons due to the difference of the physical characteristics between the different species and the difficulty to find a proper physical model.

As it will be explained, the physical properties of wood are defined through three different directions which are parallel, perpendicular or tangent to the fibres.

It will be also covered the fact that not all the fibres will follow exactly the same direction so some hypothesis and simplifications will be taken.

When talking about wood and its modelization we also have to know that some external factors as humidity or heat can have a high influence on wood's properties.

The present work deals with the elaboration of a material law within Ls-dyna software that will be able to reproduce the behaviour of wood under quasi-static compressive loads until large deformation, as observed physically in real experimental tests. A second task of the present investigation is to carry out a literature survey to study different constitutive material laws proposed by other researchers over the world such as The Tsai criterion, Hoffman Failure criterion or P. Mackenzie-Helnwein.

The results obtained using different models available in Ls-dyna (MAT024, MAT026, MAT063, MAT126 and MAT105) based on elastic and/or elasto-plastic behaviour, both isotropic and orthotropic, show that is possible to simulate adequately the wood behaviour under quasi-static compressive loads until large deformations.