



Influence Des Fissures Sur l'Evolution De La Flèche Des Poutres Entaillées Soumises Au Fluage En Climat Variable



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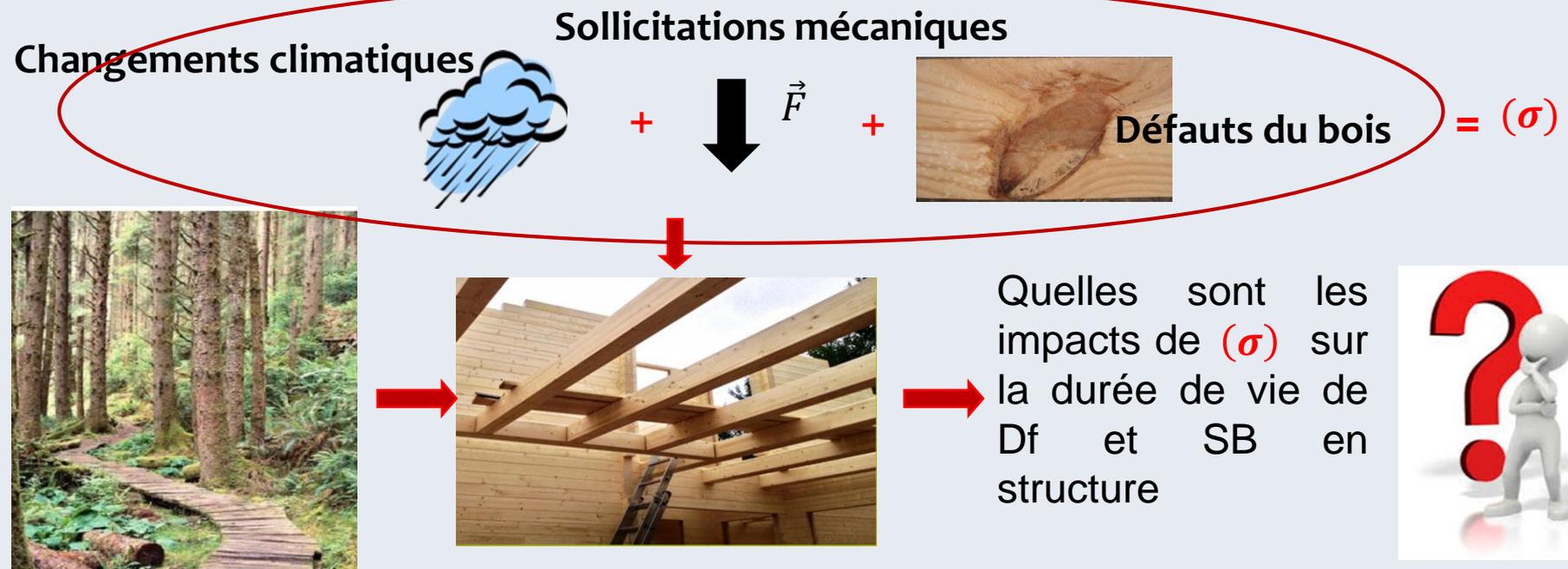
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Contexte et Objectif Scientifique

- ❑ Problèmes des phénomènes thermo-visco-hydro-mécaniques associés aux processus de fissuration du bois en structures
- ❑ Mettre en exergue les liens entre la propagation des fissures, les défauts du bois, les changements climatiques et les sollicitations mécaniques sur la durée de vie des bois en structure



Dispositif et Méthode Expérimentale

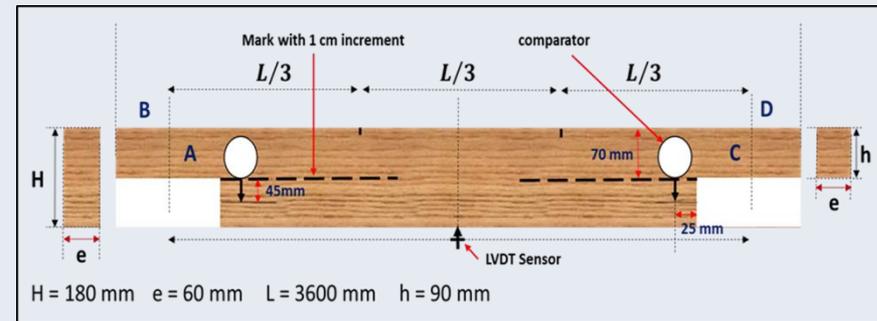


Figure 1: Type de specimen testé



Figure 2: Compateur



Figure 3: Capteur LVDT



Figure 4: (a) Poutres de Douglas en essai; (b) Poutres de sapin Blanc en essai.



Investigation of Douglas Fir and white Fir beams deflections subjected to climatic changes

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1. Context & Objectives

Climatic changes → Mechanical solicitations → Wood defects = (Δ)

What is the impact of (Δ) on the life's structure of wood?

Wood in Forest → Timber structures

Proposed an experimental model of creep loading in climatic changes

- Investigate the impacts of RH and T on the evolution of deflection
- Investigate the impacts of crack propagation on the evolution of deflection
- Study the effects of the coupling of climatic parameters, crack propagation and the loading intensity on the evolution of deflection

2. Experimental Setup

Type of specimen use: Beams in external creep loading. Comparator: LVDT sensor.

3. Results

3.1. Influence of RH and T on the evolution of the crack

Fig. 1 presents the typical propagation of tips of the crack (Fig. 1a) appeared at the notched beam and the propagation of the crack opening (Fig. 2a) versus the evolution of temperature of the middle. As presented, the results show that the growth of the cracks length are carried out during the drying process. Indeed, the ellipses showing in the Fig. 2 show that the evolution of these two parameters are effective during the drying process of temperature.

Fig. 3 Typical evolutions of tip crack length and crack opening vs climatic parameters

The Figs. 3a, 3b, 3c, and 3d show respectively the evolutions of the deflections of the beams 1a, 5a, 5b and 6a versus the evolutions of cracks appeared on each of them during their loading. The ellipses in pink on each figure, show the pronounced impact of the rise of length of cracks on the evolution of the deflection. According to these figures, the rise of length of the cracks create a disturbance on the evolution of deflection by amplifying it (Fig. 3a and 3b). This result shows that, the deflection are not only during the maturing process but also during the drying process. Indeed, the presented results show that the cracks appear during the drying process (period where the temperature increases), knowing that spread of cracks impact on the evolution of the deflection it appear logical to say that the deflection increases during the drying process with the growth of cracks.

3.2. Influence of RH and T on the evolution of deflection

Figure 4 shows the deflection increases using the increasing process (Fig. 4a and 4b) and during the drying process (Fig. 4c and 4d). Note some beams do return to their initial position.

Figure 5 Typical evolutions of the beams deflection vs climatic changes

Figure 6 Typical evolutions of the beams deflection vs crack propagation

4. Perspectives

Propose an analytical model of beams deflections versus RH and T taking into account the crack propagations phenomenon and the diffusion phenomenon in wood

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