Timber wood engineering

Dolomiti Pro research results

A short view to next researches

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Log house: a safe house ?

Would a log house survive a strong seism ?

How long will timberwood last ?

Why engineers are afraid of wood, and choose concrete and steel ?

Is a log house really warm, dry and healthy ?

Log house certification

CasaClima (2002)

healthy, energy efficient but no seism test

KlimaHaus®
CasaClima

Dolomiti Pro (2011)

seism and fire test
Long-lasting, building life certification (over 50 years) still missing

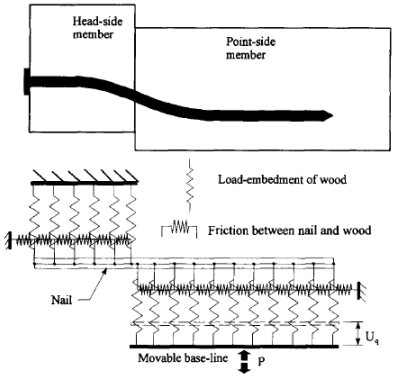
dolomiti pro

Timber and seism: not only wood

Joints will have plastic deformations

Need to take into account in simulations,
no engineering-ready models yet

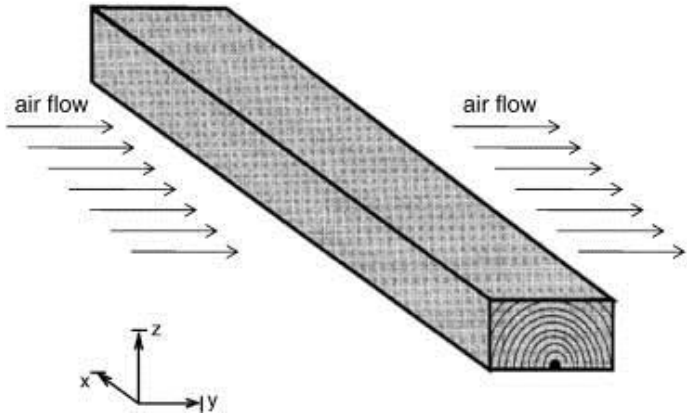
Most people killed by non structural, falling furniture!



Finite element simulation

- Water infiltration in basements : water penetration front
- Requires multiphysics!
- hygro - thermal (HT) computation
- wood retires when drying
- Mould

All this will affect building-life certification and healthiness

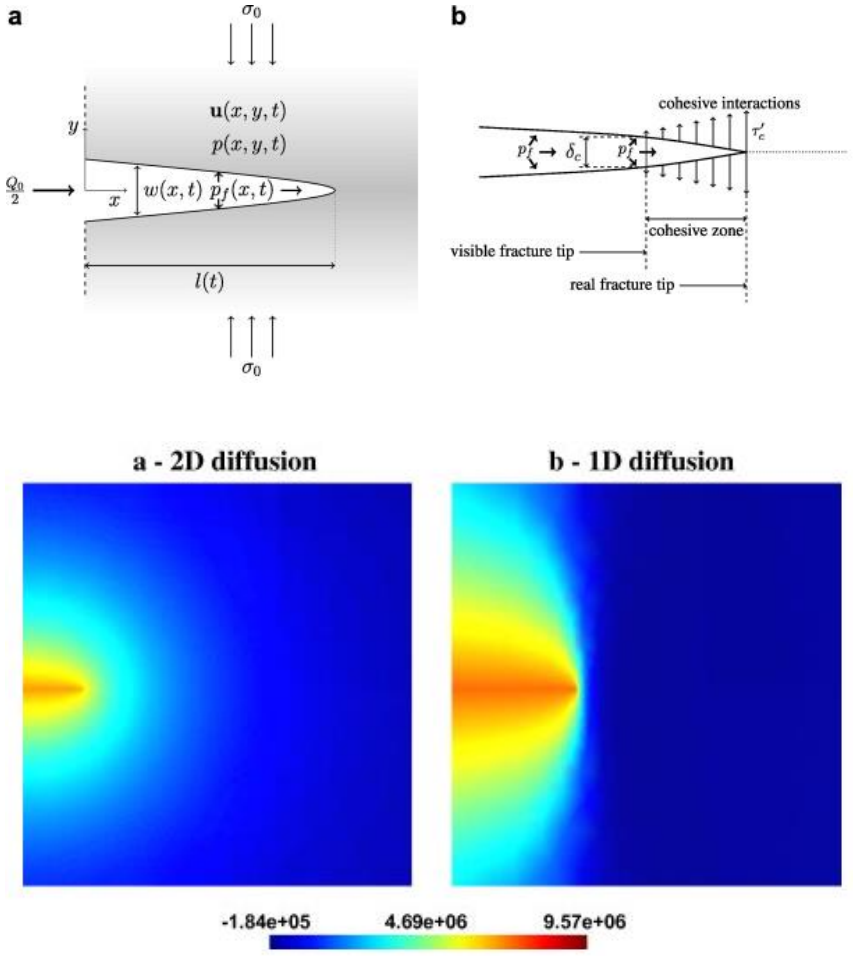


Applied multiphysics

Numerical simulation of
thermo-hygro-mechanical
behaviour

Needed in many cases :
damage in concrete,
moisture formation, wood
drying process...

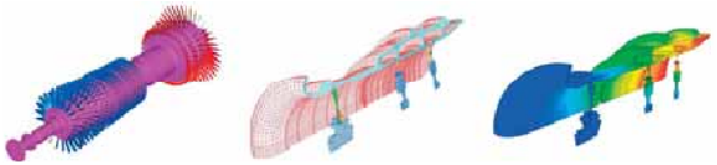
Example of water diffusion in a joint :
flow in a crack coupled with
diffusion in the porous material



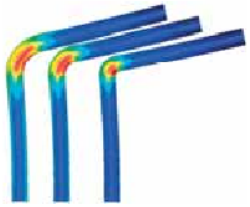
Code_Aster

Finite Element Software
Created by EDF (main energy producer in the world) for its internal research and engineering

20 years of development
50 full time developers, over 200 users
1 500 000 code lines
14 000 pages (both theoretical and practical documentation)
2 000 tests
free : www.code-aster.org
nuclear plants and dams quality certified



Nonlinear thermomechanical calculation of a combustion turbine compressor : bladed rotor and quartercompressor.



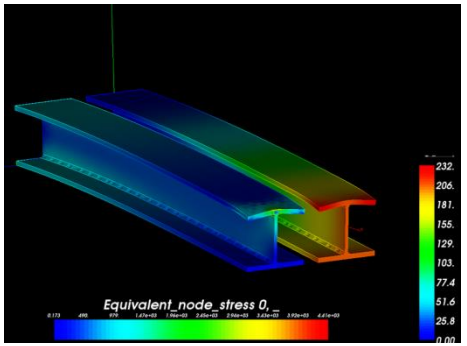
Optimizing the bending radius of an elbow by Gmsh-Code_Aster chaining.

RRA circuit elbow : damage calculation by the Dang Van criterion and thermal crazing.

Code_Saturne/Code_Aster chaining on an Alstom-Velan glove valve : mesh and internal fluid pressure field.

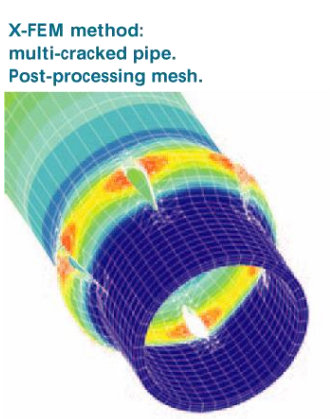
We need wood models

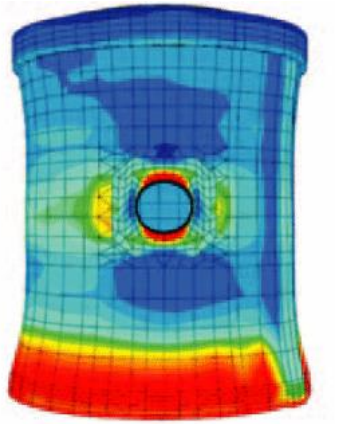
Engineers need models to
verify, calibrate and
simulate scenarios



Concrete and steel are well
known materials, "easy"
to simulate

Behaviour over time





Thank you for your kind attention!

in memory of Paolo Piffer

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