



COMPORTEMENT ET EVALUATION DES OUVRAGES SPECIAUX
« Behaviour and Assessment of special R.C. works –
cracking & shrinkage » - www.ceosfr.org



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French national research project
CEOS.fr

« Behaviour and Assessment of specific
R.C. works – cracking & shrinkage »

president : P. Labbé

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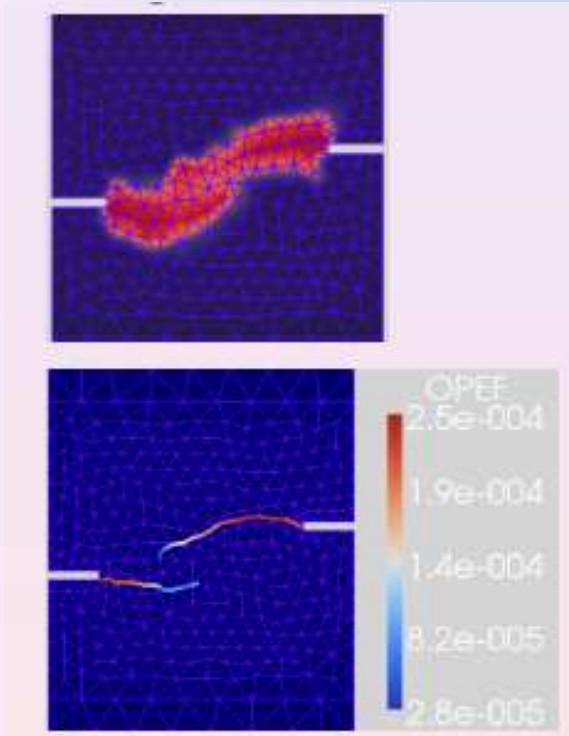
2008-2011 – 40 members (project owners, companies, lab., universities) – budget 8 M€

- Cracking is a phenomenon which is a complete part of the functioning of concrete structures. However, its control is essential to ensure a good behaviour of the structures with time and so it is a major concern for durability and sustainability.
- CEOS.fr aims at dealing with this problem, in particular for special works (specific use, specific shape and size, specific requirements for loading or durability...), coupling numerical and experimental approaches and those coming from engineering.

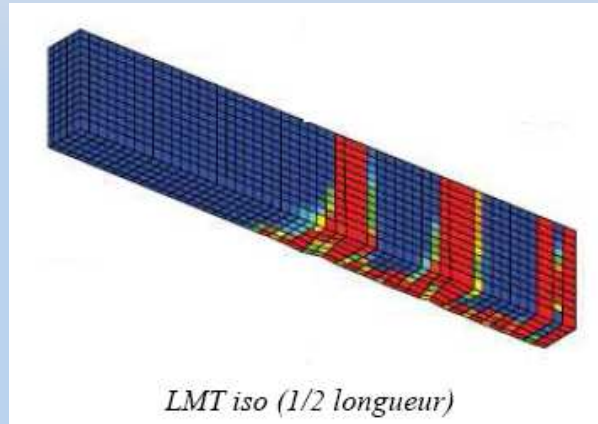
- Questions from engineering :
 - Need for a better description of cracking
 - Domain of application of EC rules limited (large structures not included) and a few experimental works related to the subject
- Offers from R&D
 - Efficient numerical models exists to help engineering to set up new tools for a better control of cracking

- 3 subjects :
 - Cracking under monotonic loadings
 - Behaviour under coupling loadings (THM)
 - Cracking under cyclic and seismic loadings
- 3 approaches :
 - Experiments
 - Numerical modelling
 - Engineering, codes

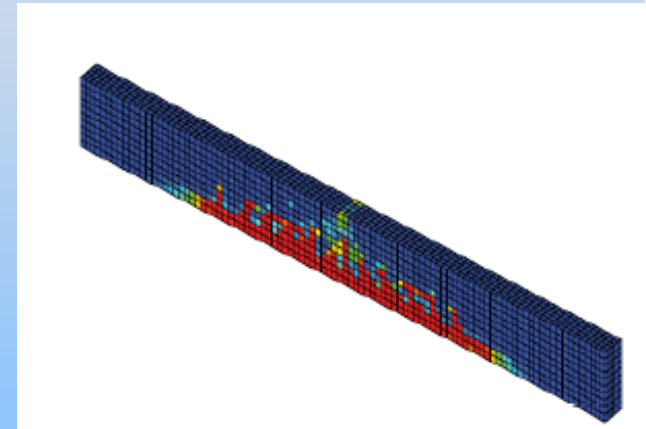
Simulations of damage and cracks



Notched sample in traction (PC)

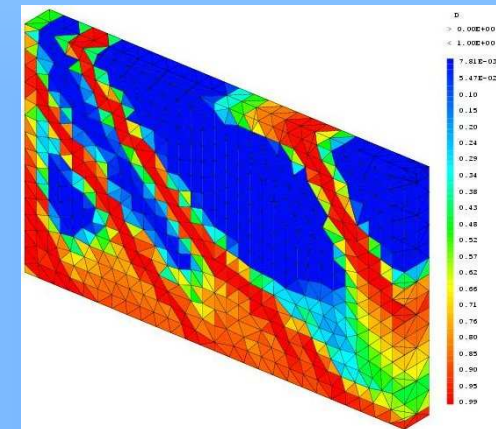


Tie beam (RC)



Bending beam (RC)

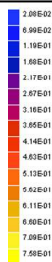
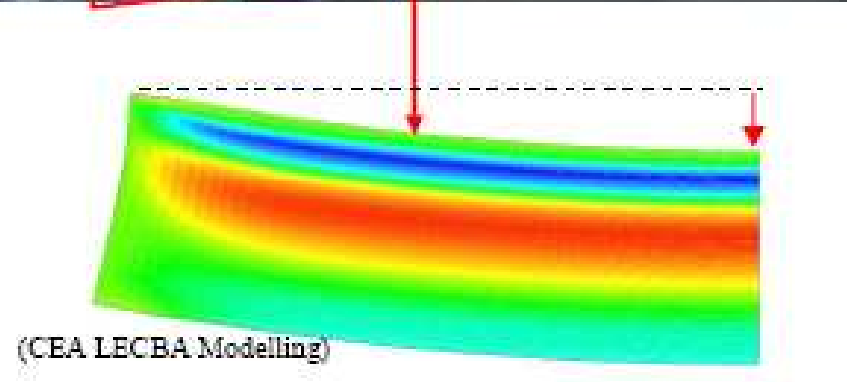
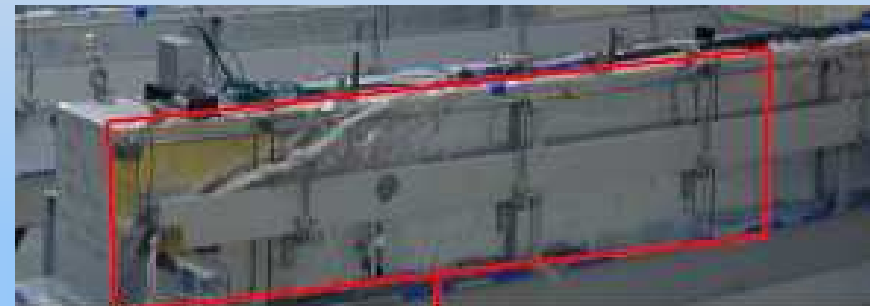
Shear wall (RC)



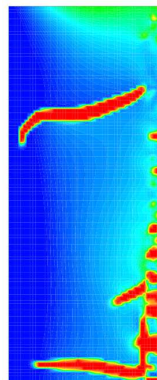
Simulations of THM situations



Cylindar under
thermal gradient



Endommagement modèle CSTB 200H

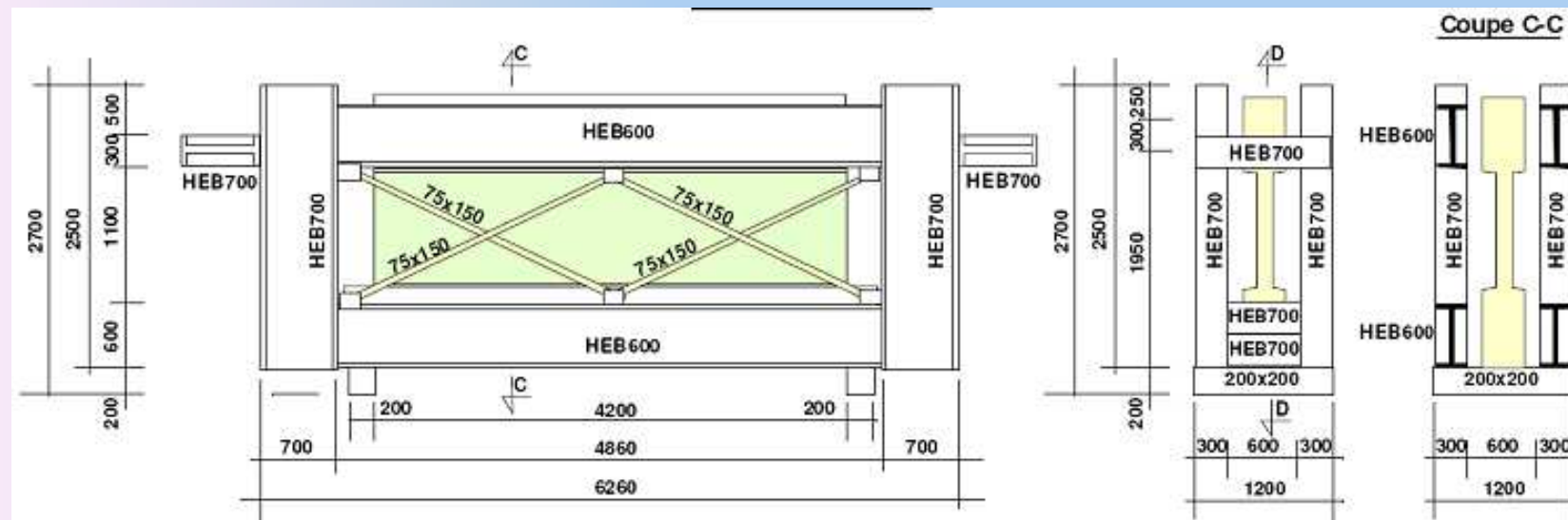


Endommagement modèle CEA 194 H

Beams under transient moisture conditions

Experiments in progress

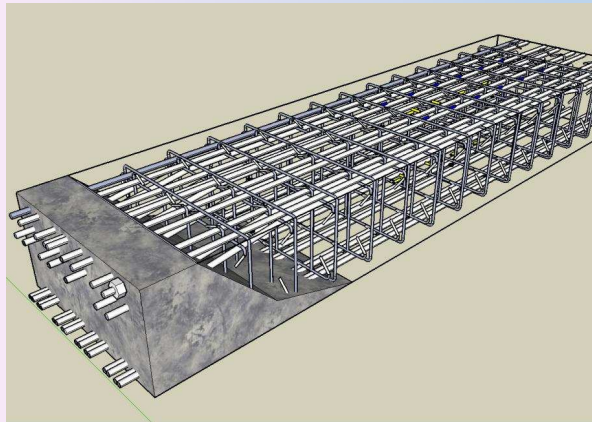
A - Shear walls (L = 4.20 m, h = 1.50 m, e = 0.15m)



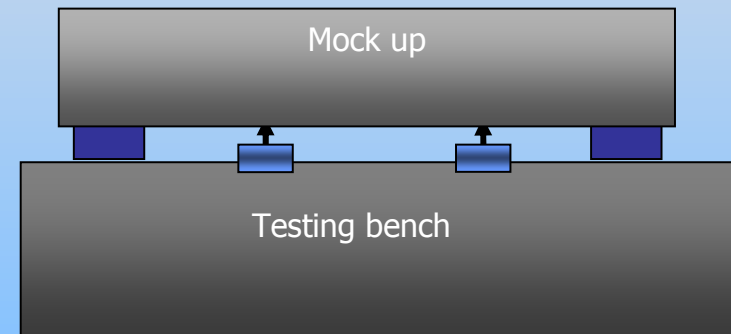
Two situations of loading : monotonic and cyclic

Experiments in progress

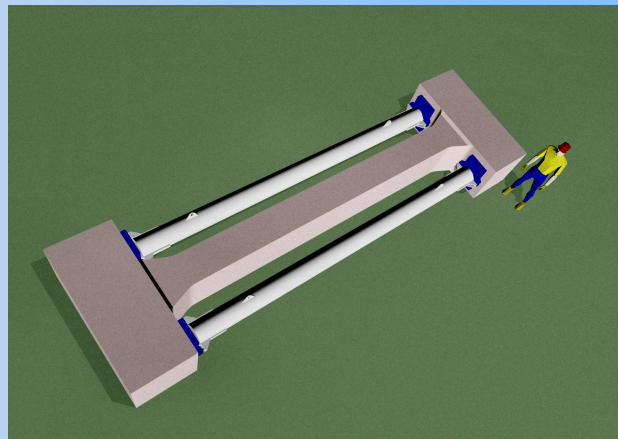
B – Large beam specimens ($L=6.10$ m, $l=1.60$ m, $h=0.80$ m)



Large beam
loaded in flexion
after free shrinkage



Large beam specimen
with *restrained shrinkage*



- **Members**

- Project owners (nuclear power plants, radioactive waste storages, airports, harbours, bridges...)
 - EDF, AREVA, Grand Port du Havre,
- Companies (building and civil works, cement manufacturers)
 - Vinci, Eiffage, Bouygues, Areva, Solétanche-Bachy, Italcementi,
- Engineering
 - Iosis, Setec, Co&B, Arcadis, Oxand, Necs, Advitam, Sites, Chryso, Rinent, Saipem, PX-Dam,...
- Private & public laboratories & Institutions
 - LCPC, CSTB, CEA, IRSN, ANDRA, ATHIL, CERIB, CEBTP, LERM, CETU,...
- Universities :
 - ENS Cachan (LMT), INP Grenoble (3S-R), Insa Toulouse (LMDC), EC Nantes (GEM), U. Pau (Lasagec), Polytech' Lille (LML),...

- International connection
 - International benchmark (www.concrack.org)
 - Based on experiments performed by CEOS.fr
 - Blind modelling work on monotonic, cyclic and THM loadings
 - Restitution workshop organised May-June 2011
 - Inscription until 15/06/2010
 - European network
 - Under construction