CAST3M : Recent developments at JRC Ispra

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A new joint model
DCOM generic interface

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A new joint model: framework program on masonry

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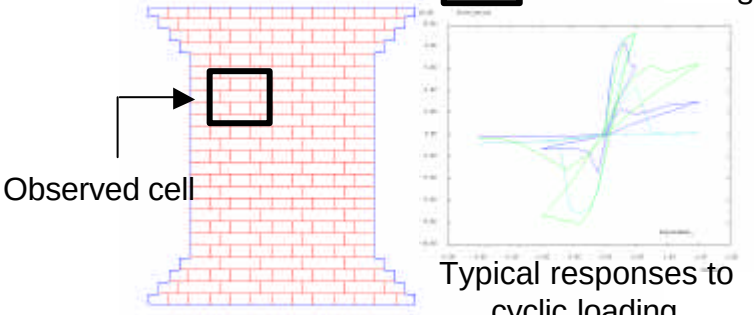
RESEARCH PROGRAM ON MASONRY WALLS

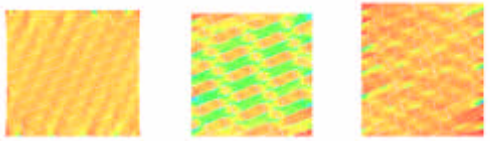
DISCRETE MODEL 1

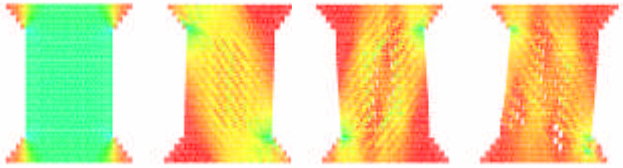


Compute the homogeneous stress/strain paths (principal directions)

WALLETTES 2a

Compute the homogeneous stress/strain paths

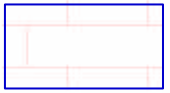




2D elastic brick + plastic joint ⇦ Implementation of a more realistic constitutive law

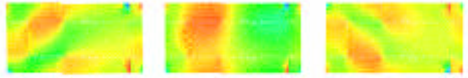
comparison

2b



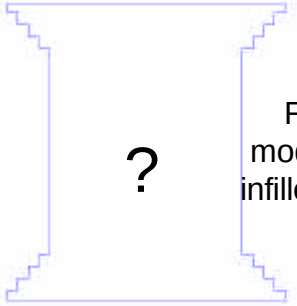
New 2D-joint element? ⇦ 3D? ⇦

BASIC PERIODIC



Macro-constitutive law (homogenized material)

3



Further modelling of infilled panels

HOMOGENIZED MODEL

Both numerical and experimental works

Numerical works

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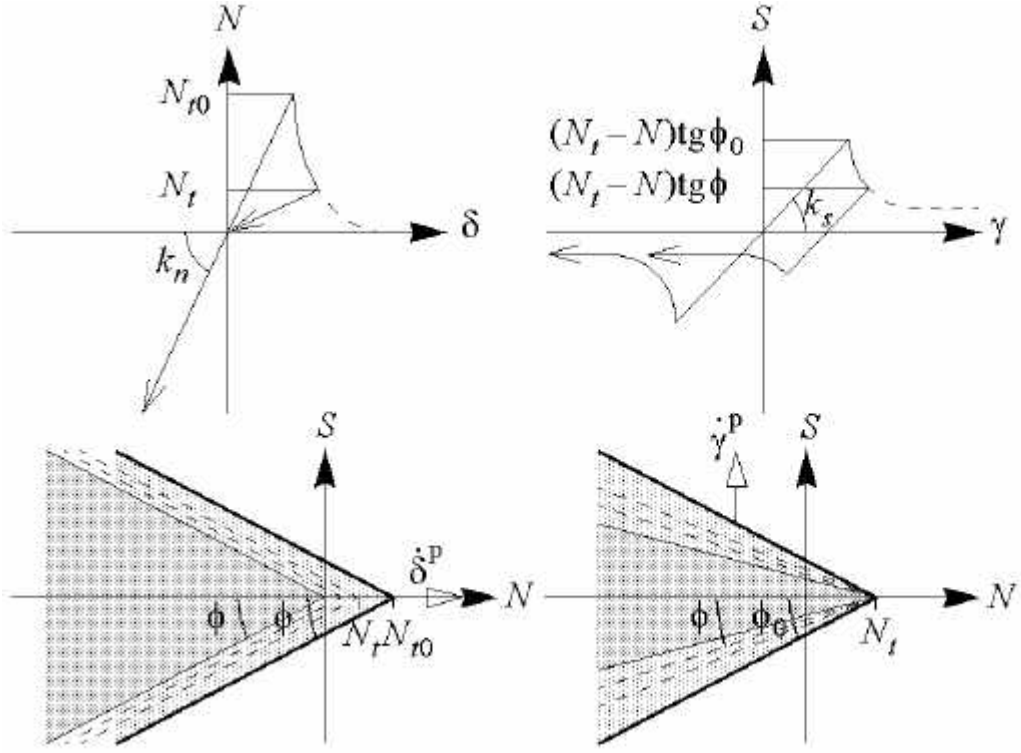
A new joint model: existing models

COULOMB (associated plasticity)

AMADEI (rock mechanics)

JOINT_DILATANT (non associated plasticity)

JOINT_SOFT (release 1)



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A new joint model: limitations of JOINT_SOFT

Lack of continuity at the tip of the elastic domain

→ tension cut-off

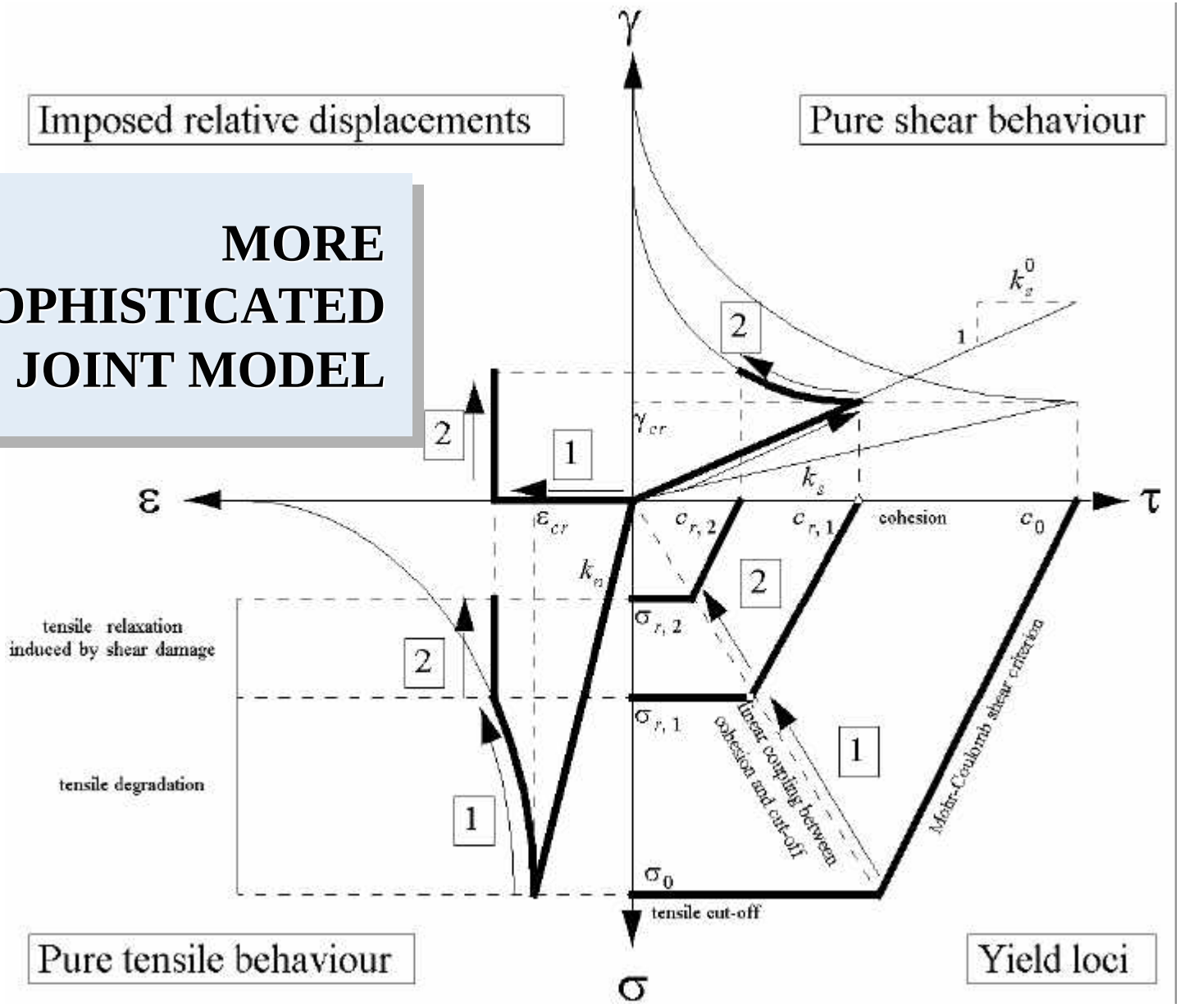
No degradation in compression

→ compression cut-off

Limitation in the collapse mechanisms

A new joint model

MORE SOPHISTICATED JOINT MODEL



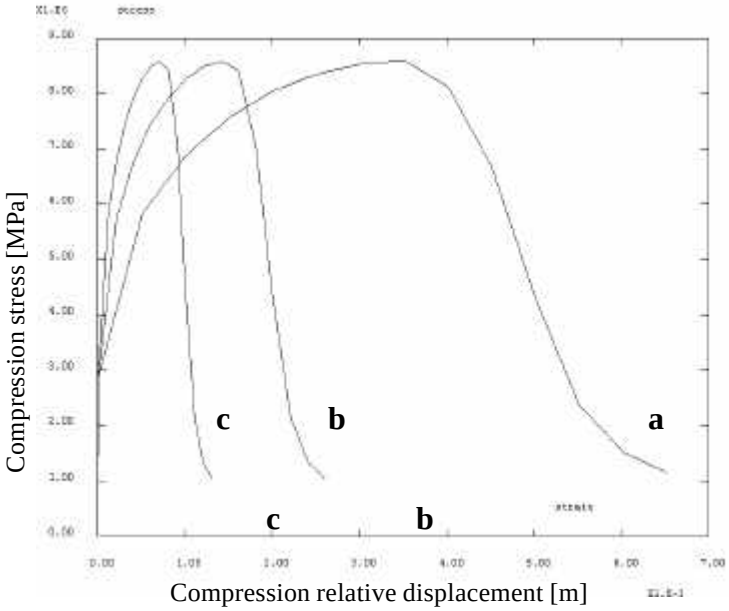
A new joint model: material parameters

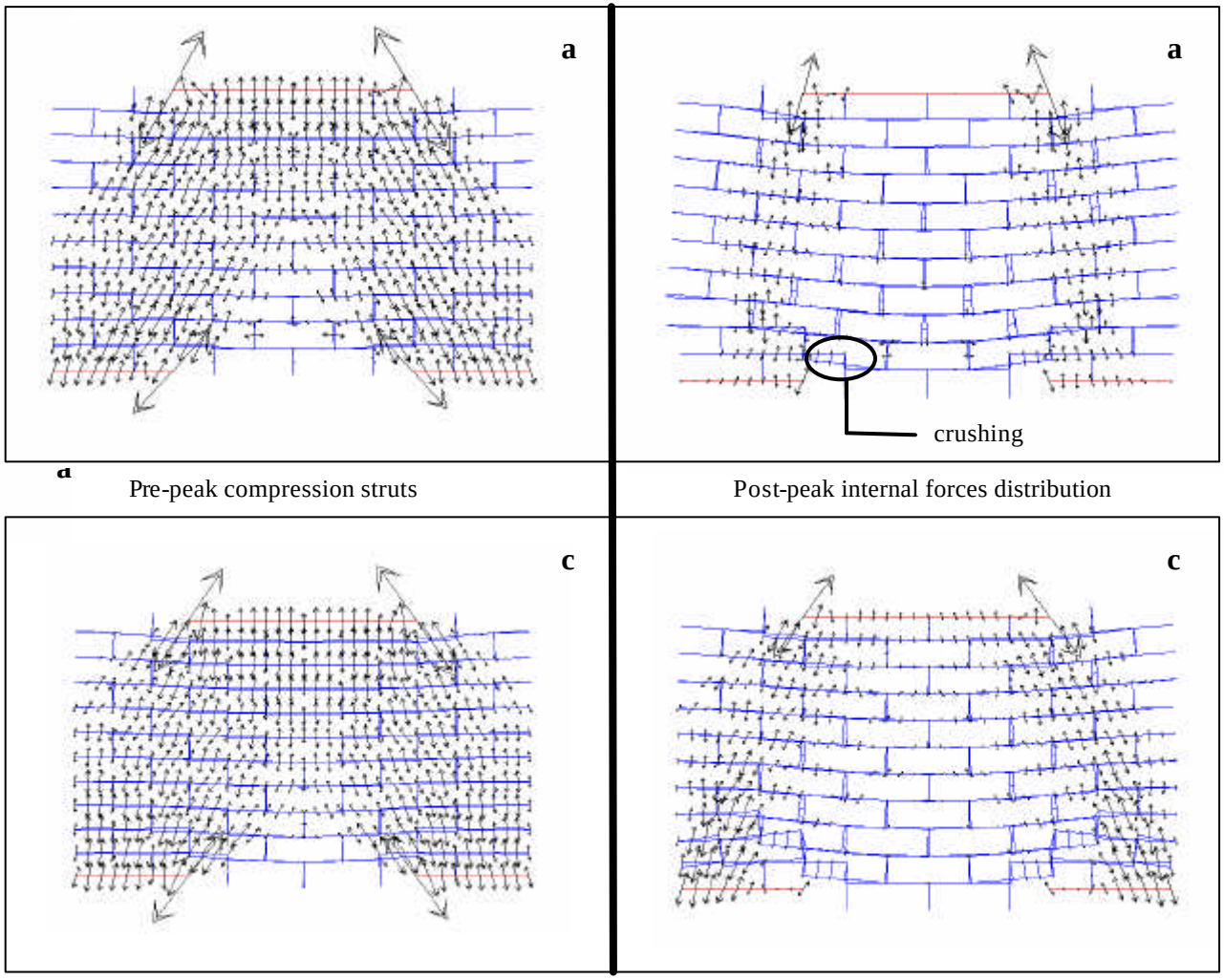
KN, KS: normal and shear stiffness

SJTB: traction curve (tension cut-off)
SJCB: compression curve (compression cut-off)
SJSB: shear curve (cohesion)

PNOR: initial location of the tip of the cone
CPLG: definition of the various couplings

A new joint model: effect of the compression cut-off (1)





Deformed meshes amplification factor: 10.

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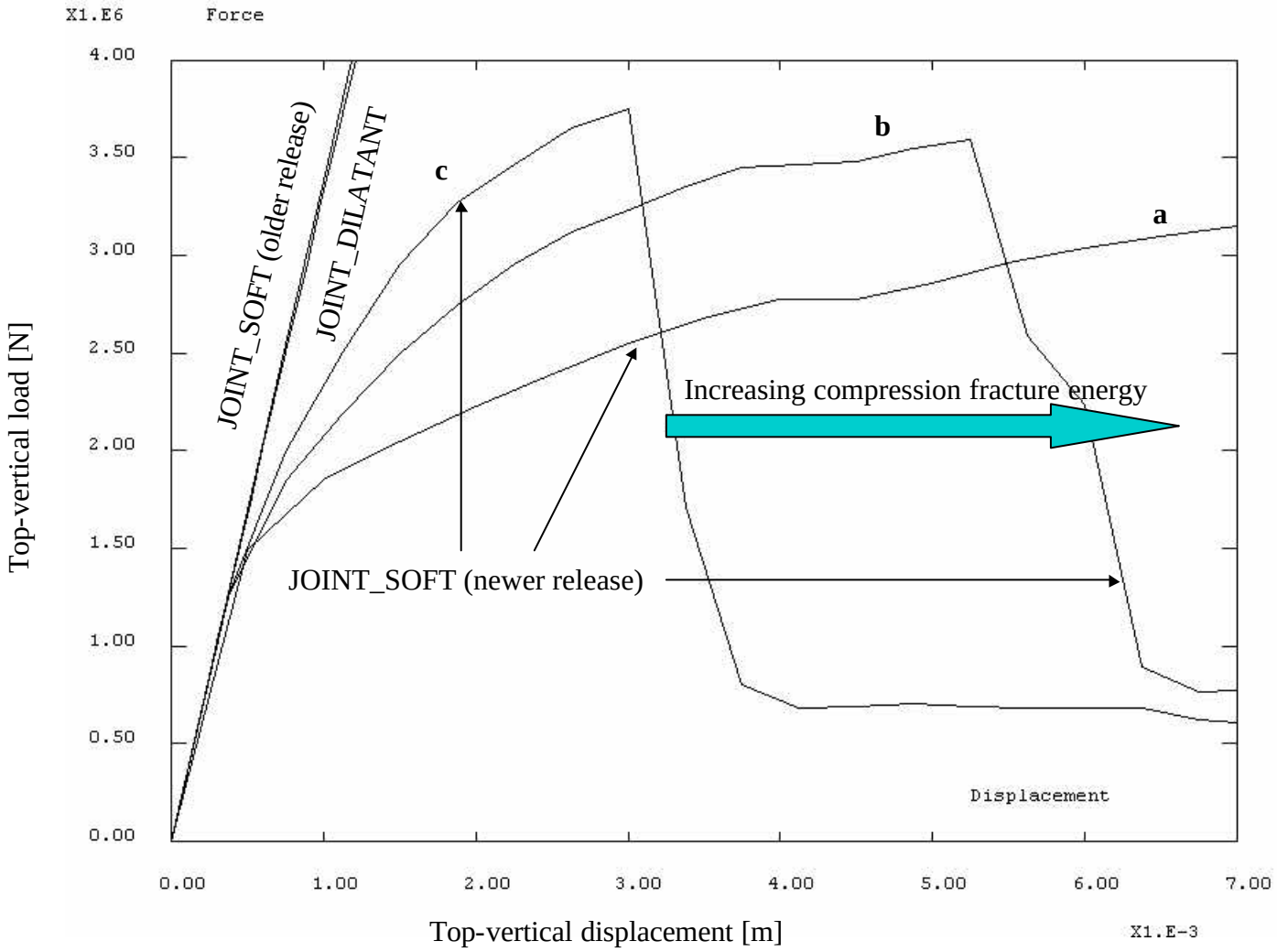
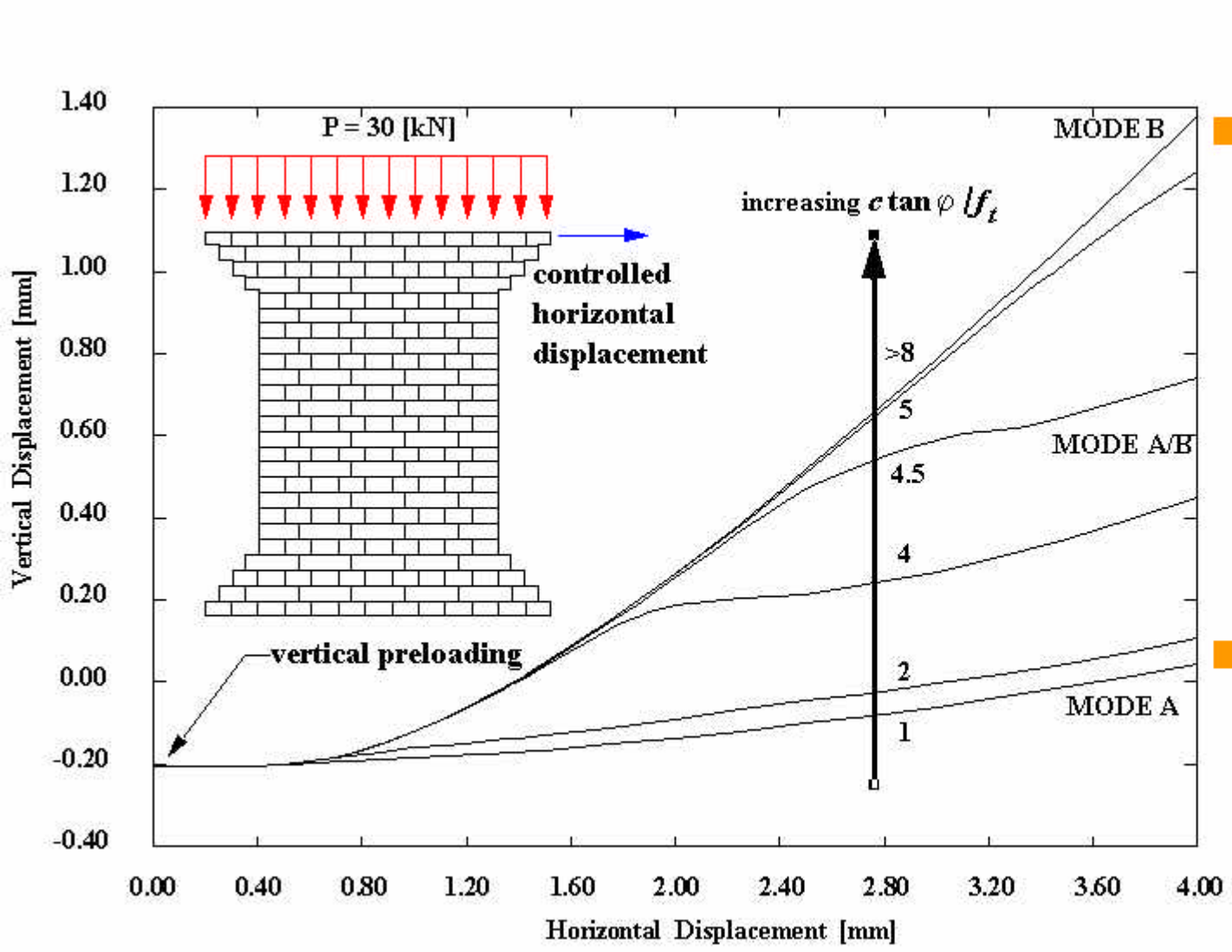
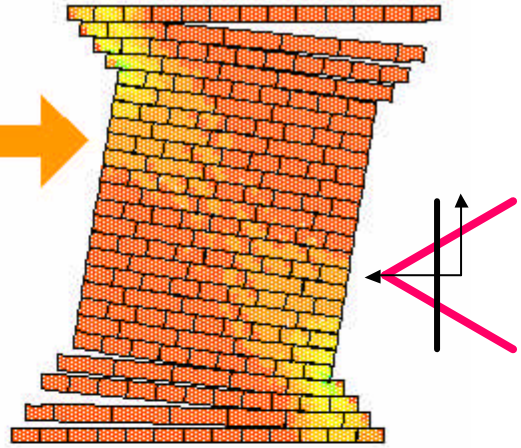
A new joint model: effect of the compression cut-off (2)

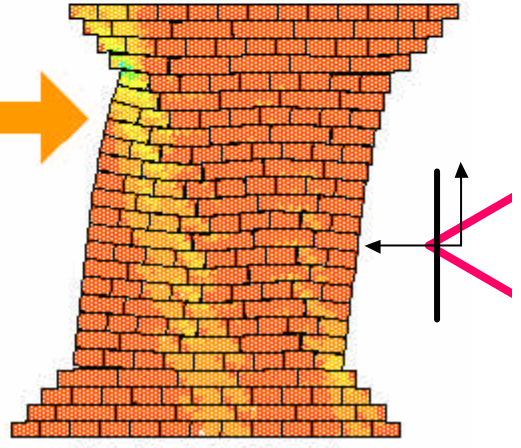


A new joint model: effect of the tension cut-off





FAILURE MODE B



FAILURE MODE A

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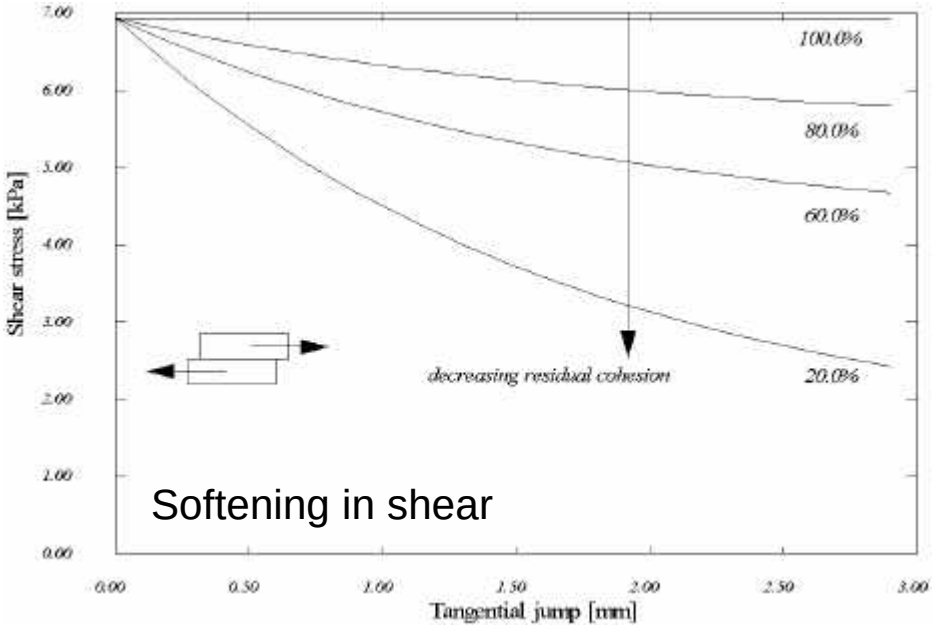
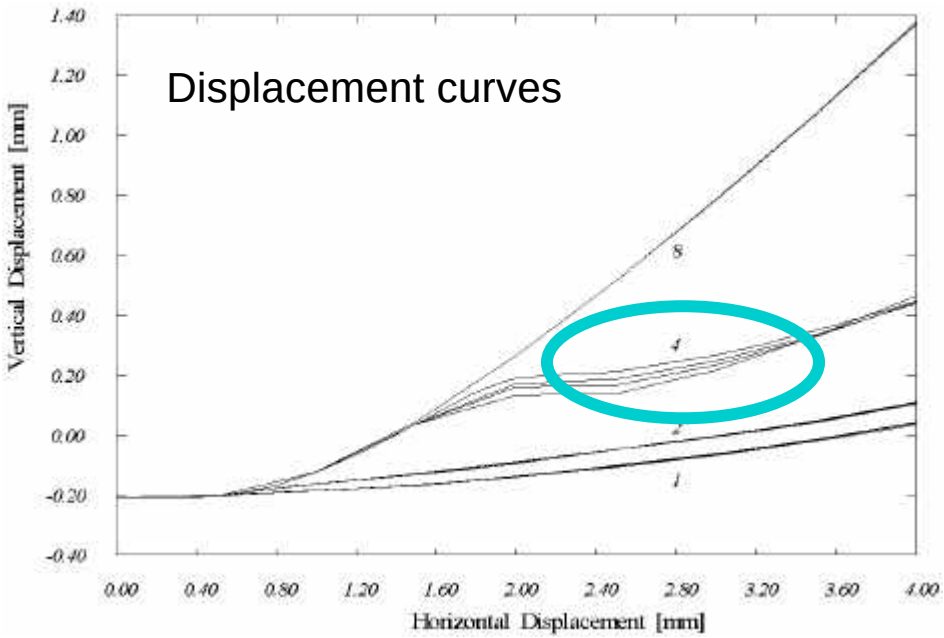
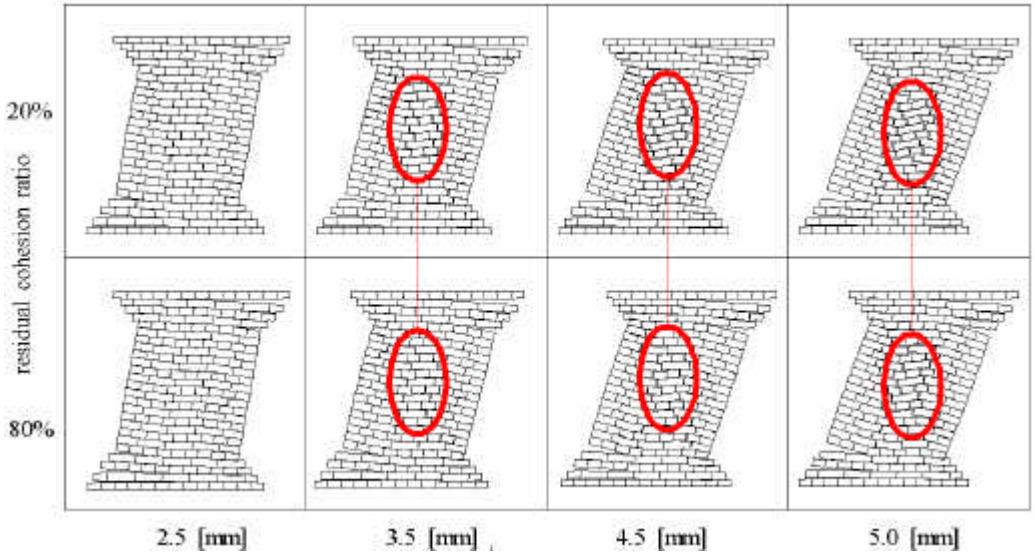
A new joint model: effect of the shear softening



Softening in shear





$$c \tan\varphi / f_t = 4$$

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A new joint model: effect of the tension softening

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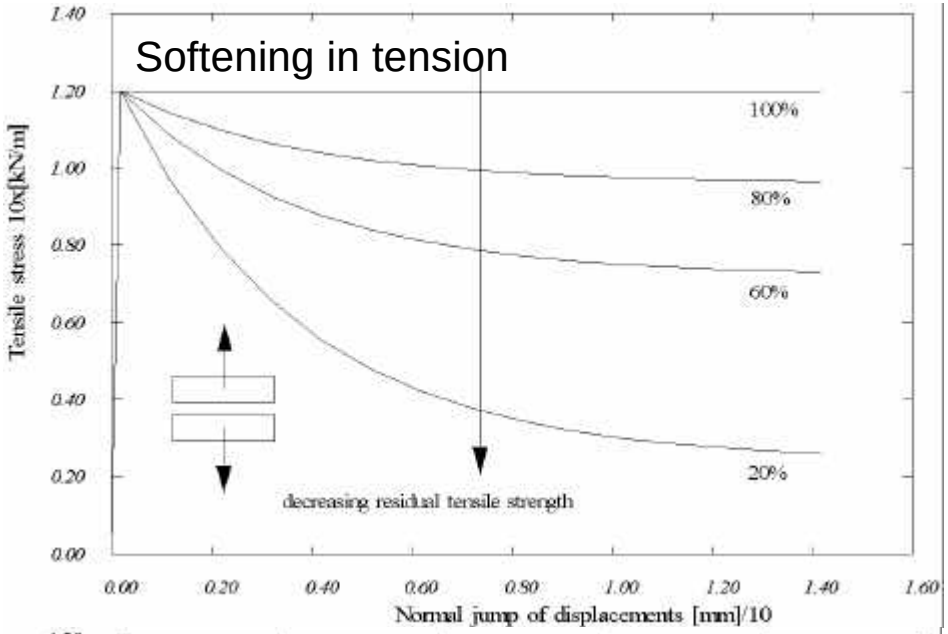

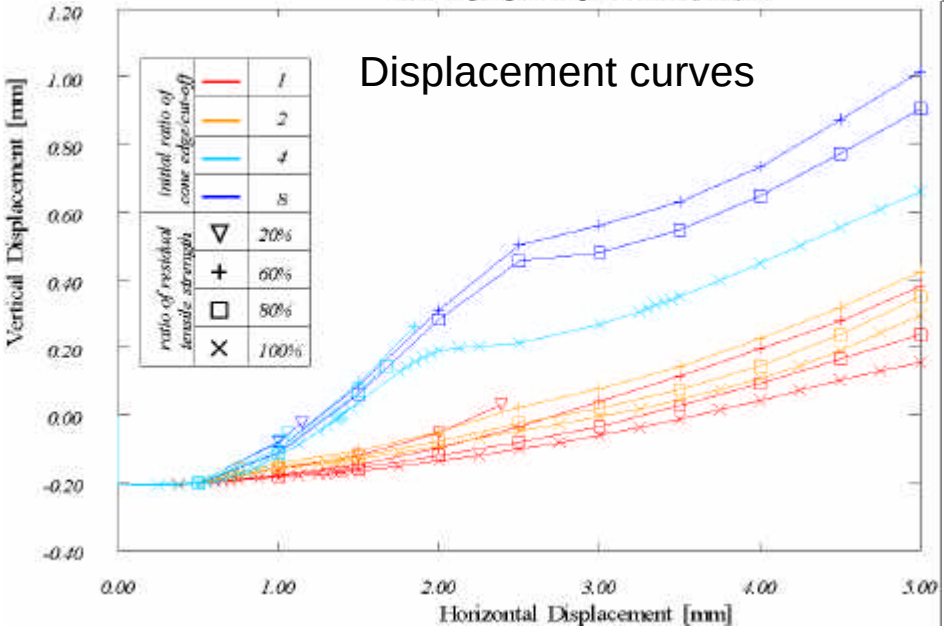

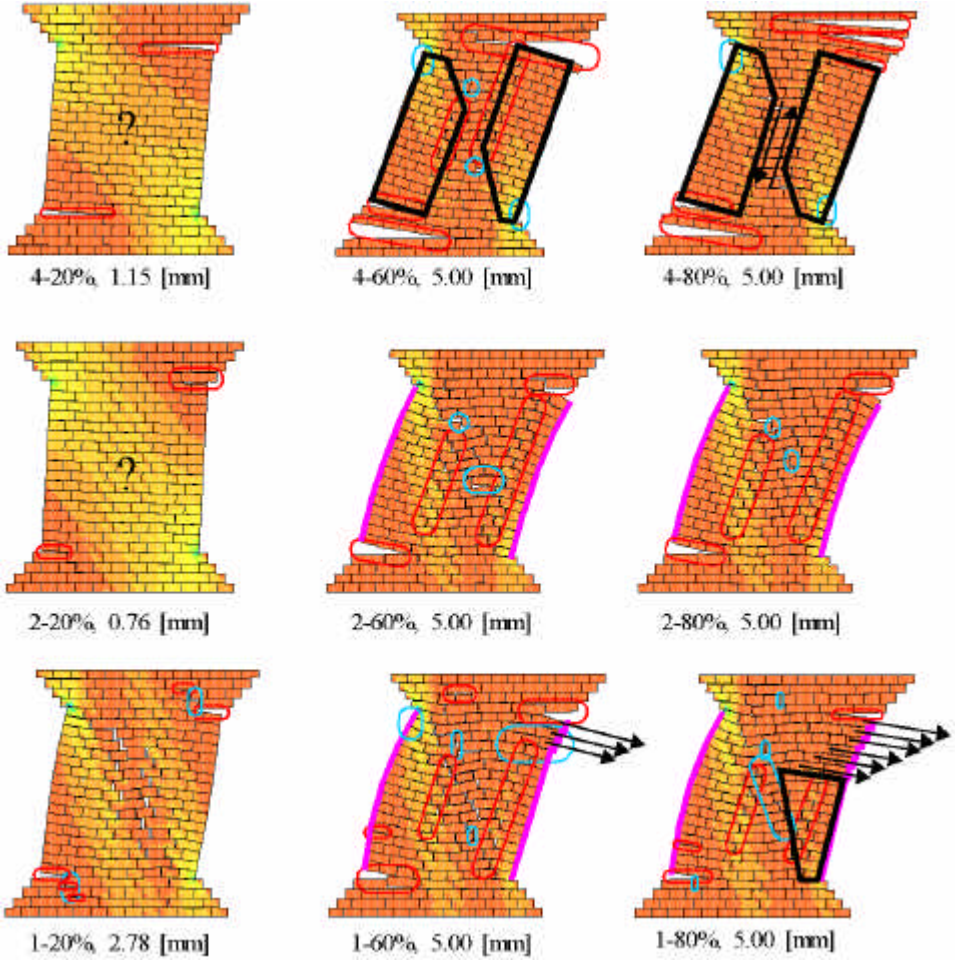

Failure mechanisms

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A new joint model: the global shear curves

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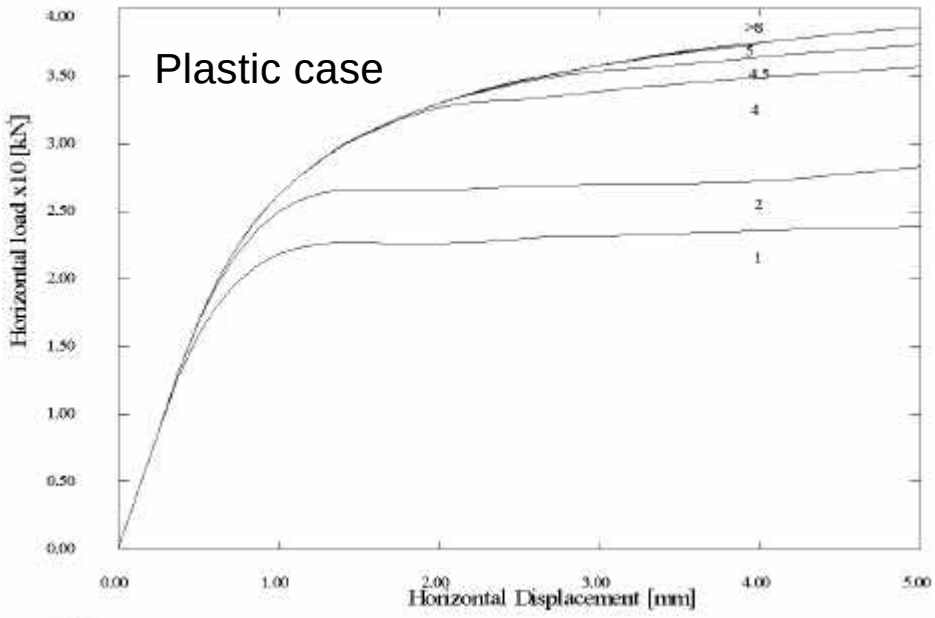
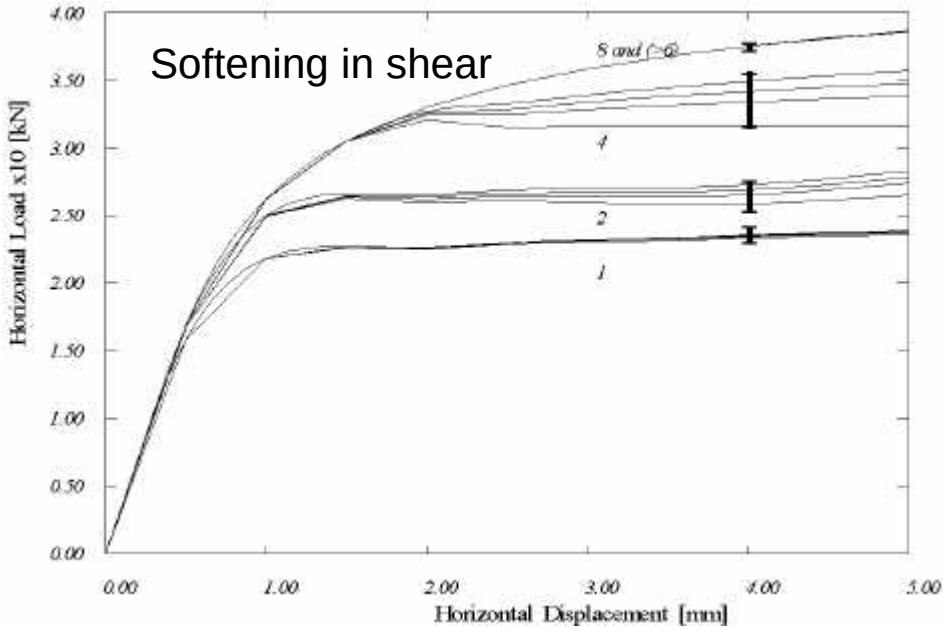
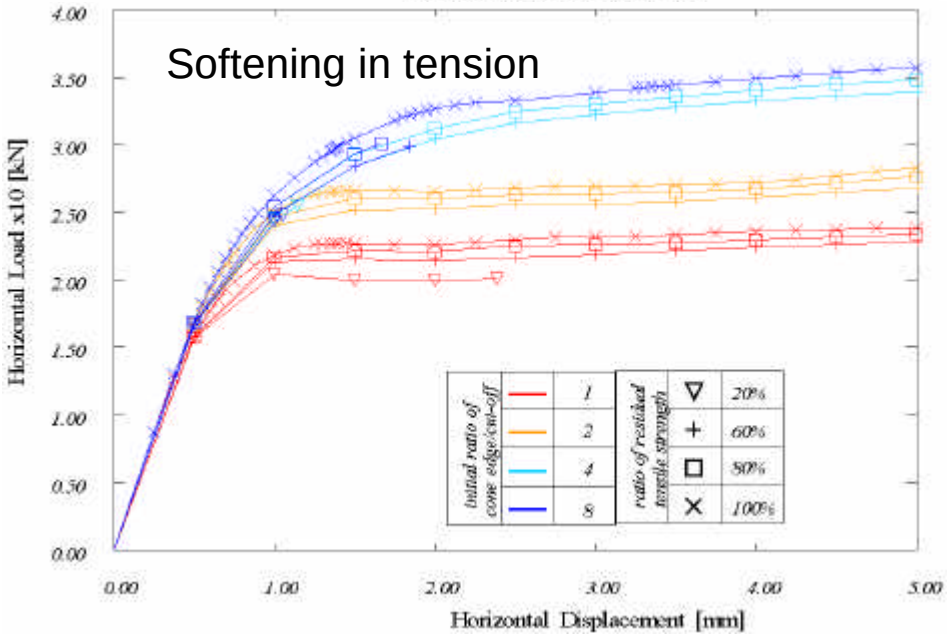
INFLUENCE OF SOFTENING ON THE SHEAR CURVES







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A new joint model: mesh generation

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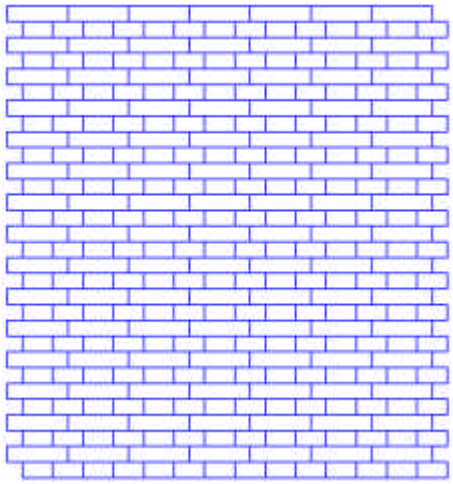
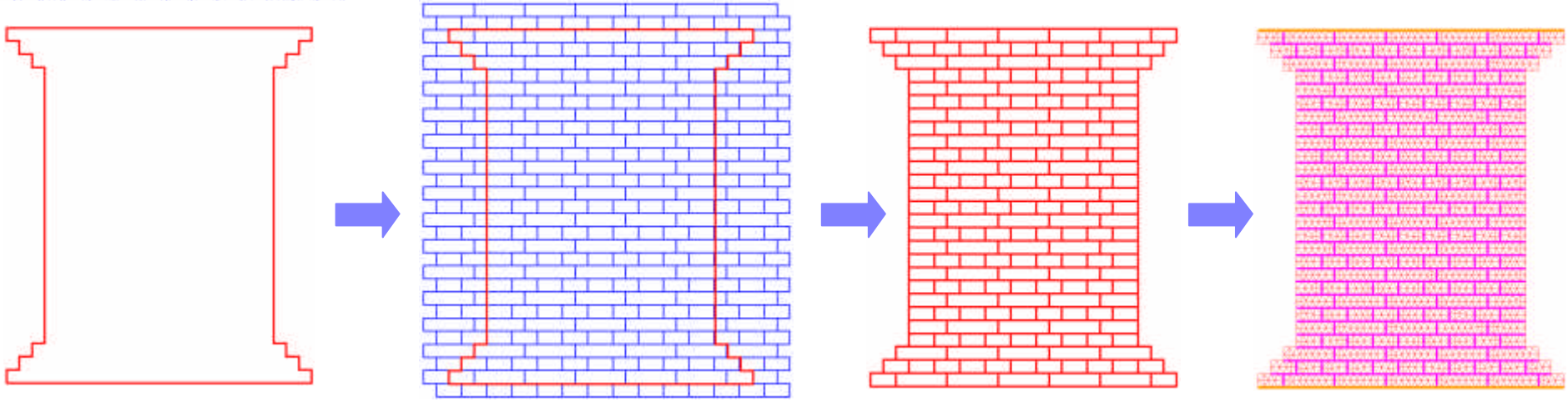


AN UNFORESEEN USE OF THE CBLO OPERATOR



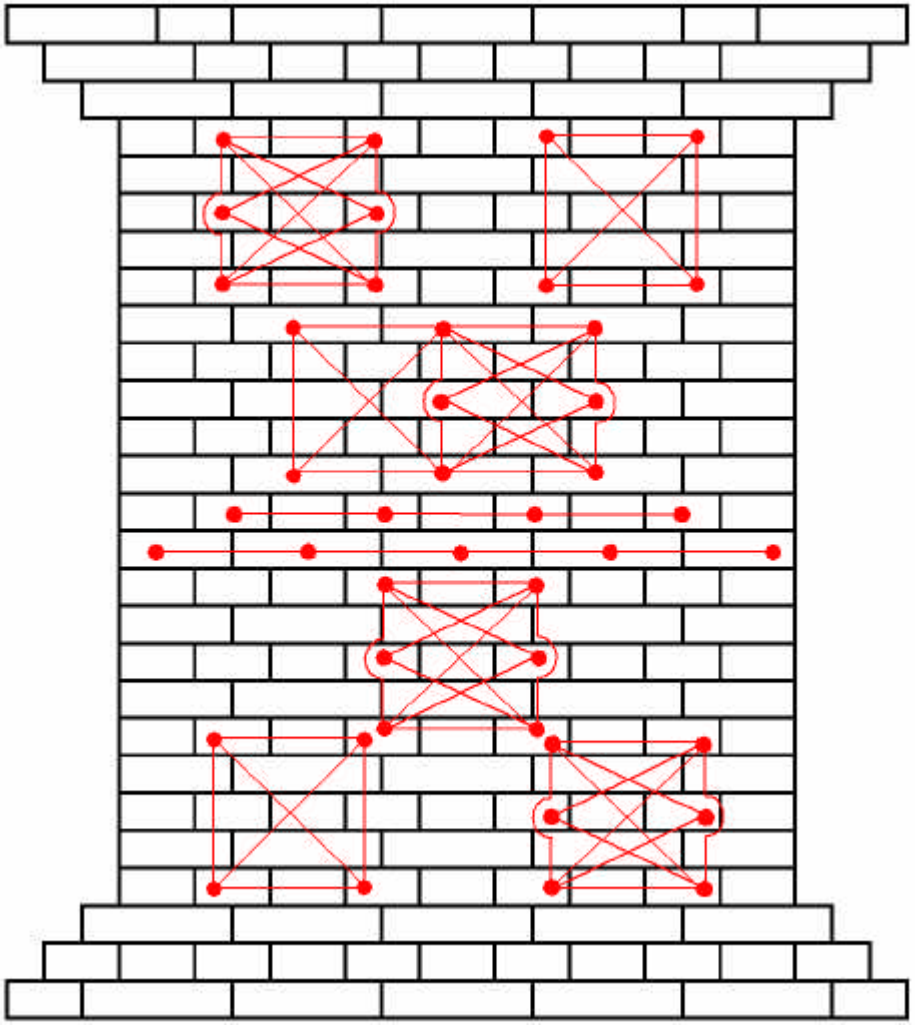
2D contours of the pattern and of the wall

CBLO in 3D (!)

2D contours of the wall blocks

Mesh of the wall and of the joints

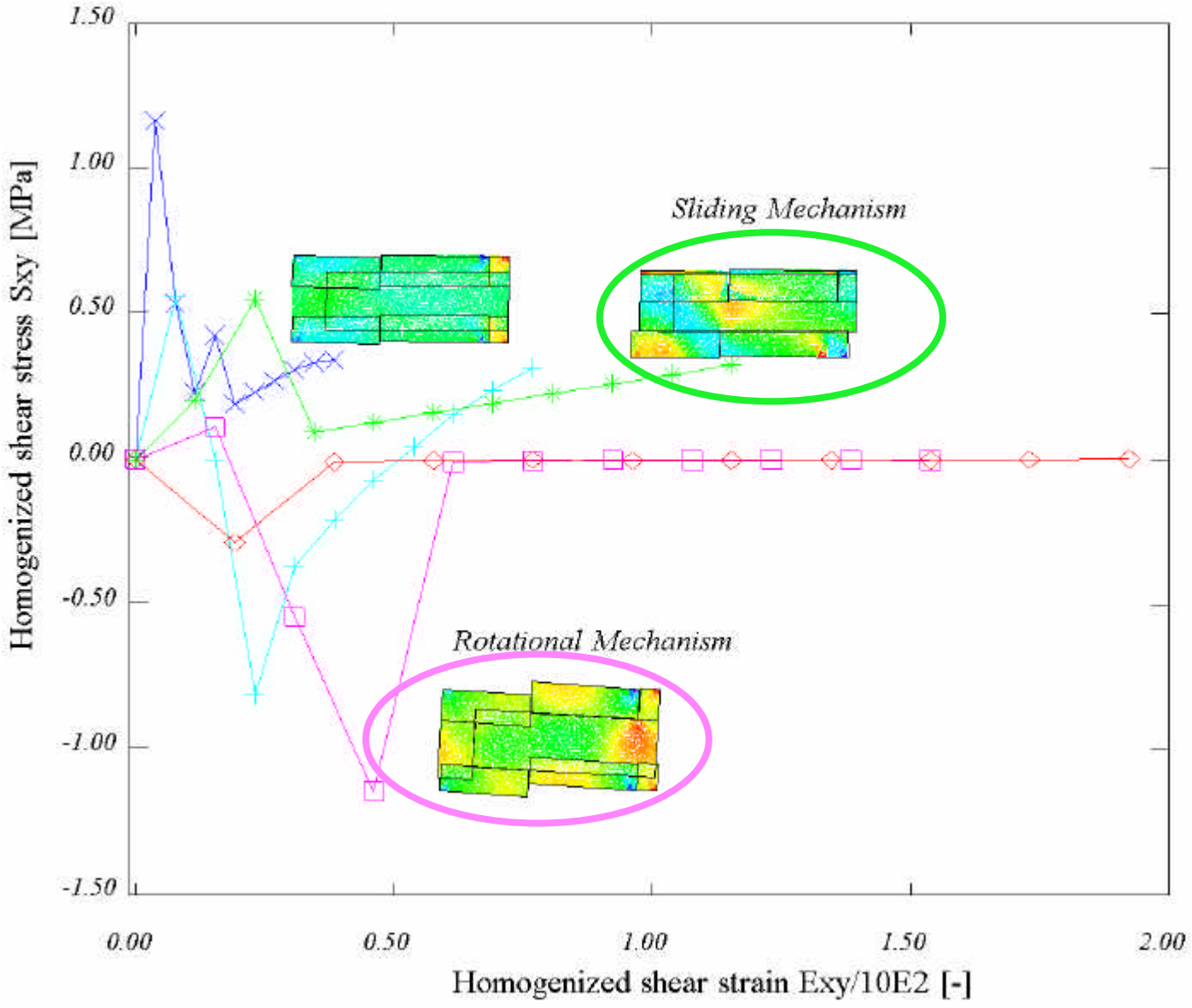
A new joint model: instrumentation and TRON operator



Deformation of the transducers ?

1. mesh of blocks (*m1*)
2. mesh of the transducers (*m2*)
3. use TRON to compute the field of isoparametric location of the nodes of *m2* in *m1*
4. use TRON to compute the displacement of the nodes of *m2* with respect to the displacement of the nodes of *m1* during the loading

A new joint model: convergence problems in extreme cases



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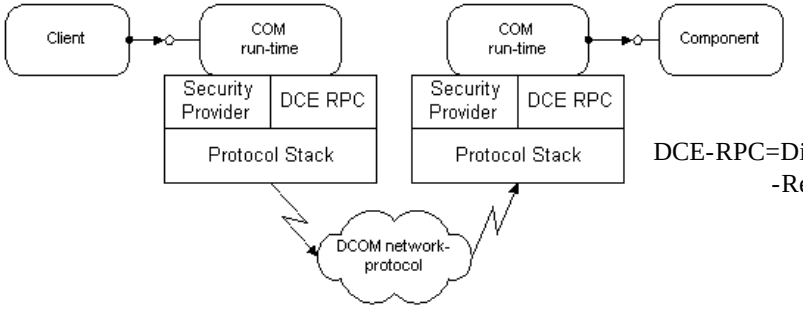
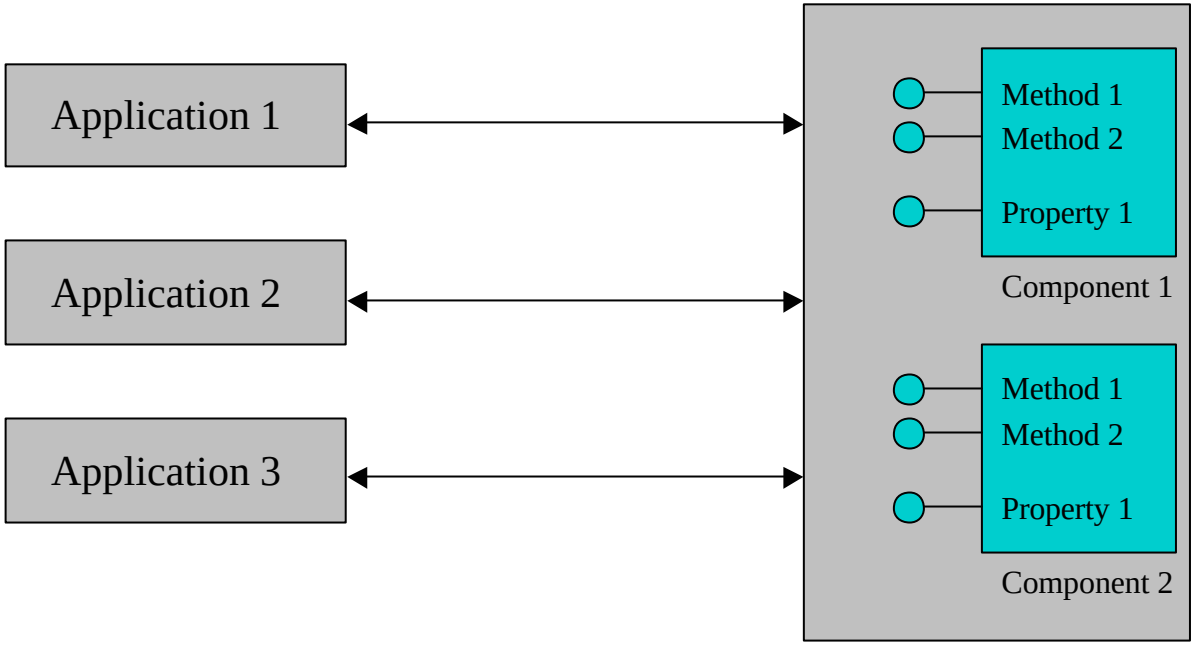
DCOM generic interface: what is DCOM

DCOM=Distributed COMponent (for Windows)



DCE-RPC=Distributed Computing Environment
-Remote Procedure Call



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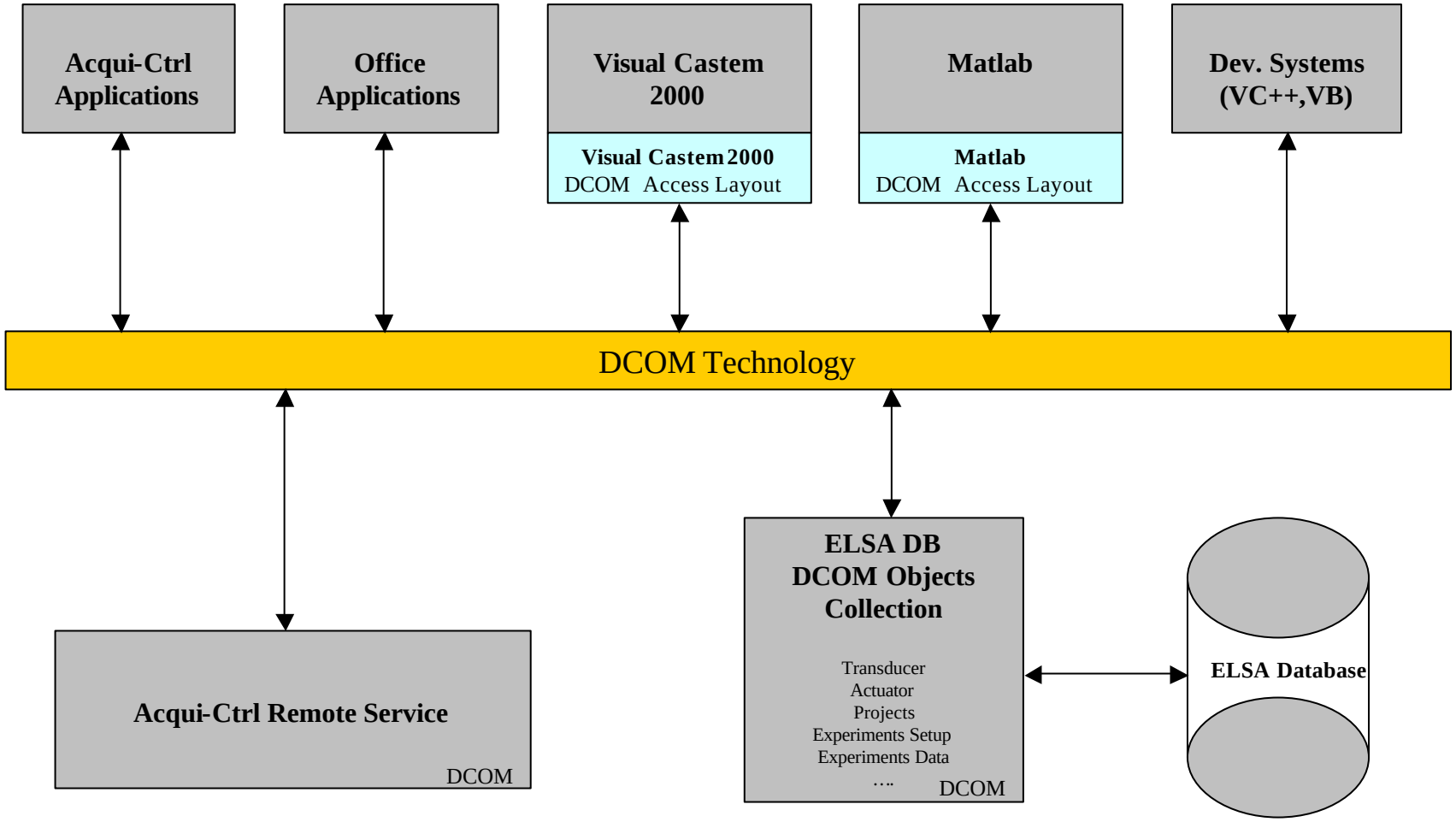
DCOM generic interface: why DCOM is used at ELSA

Process and Data Users Access



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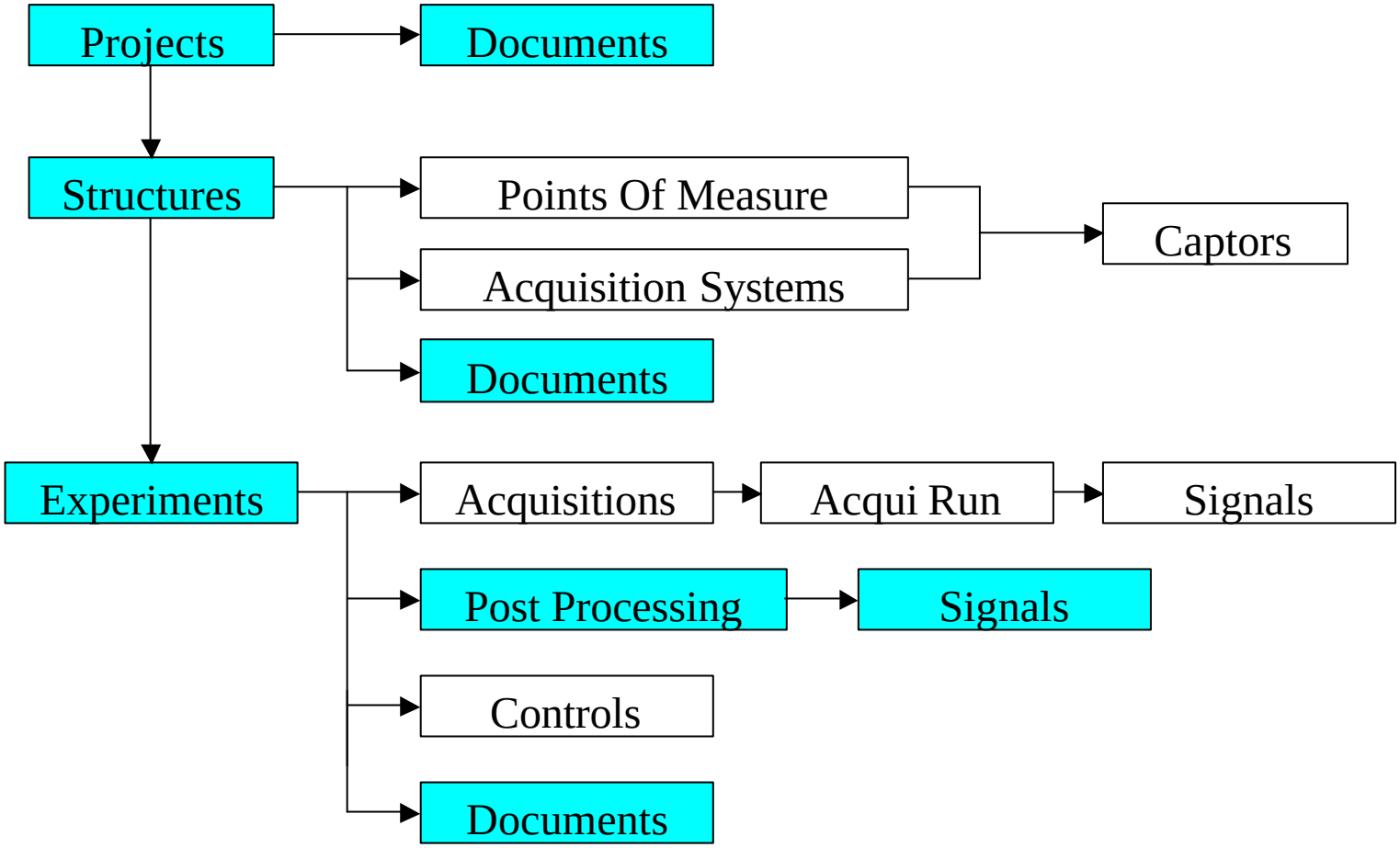
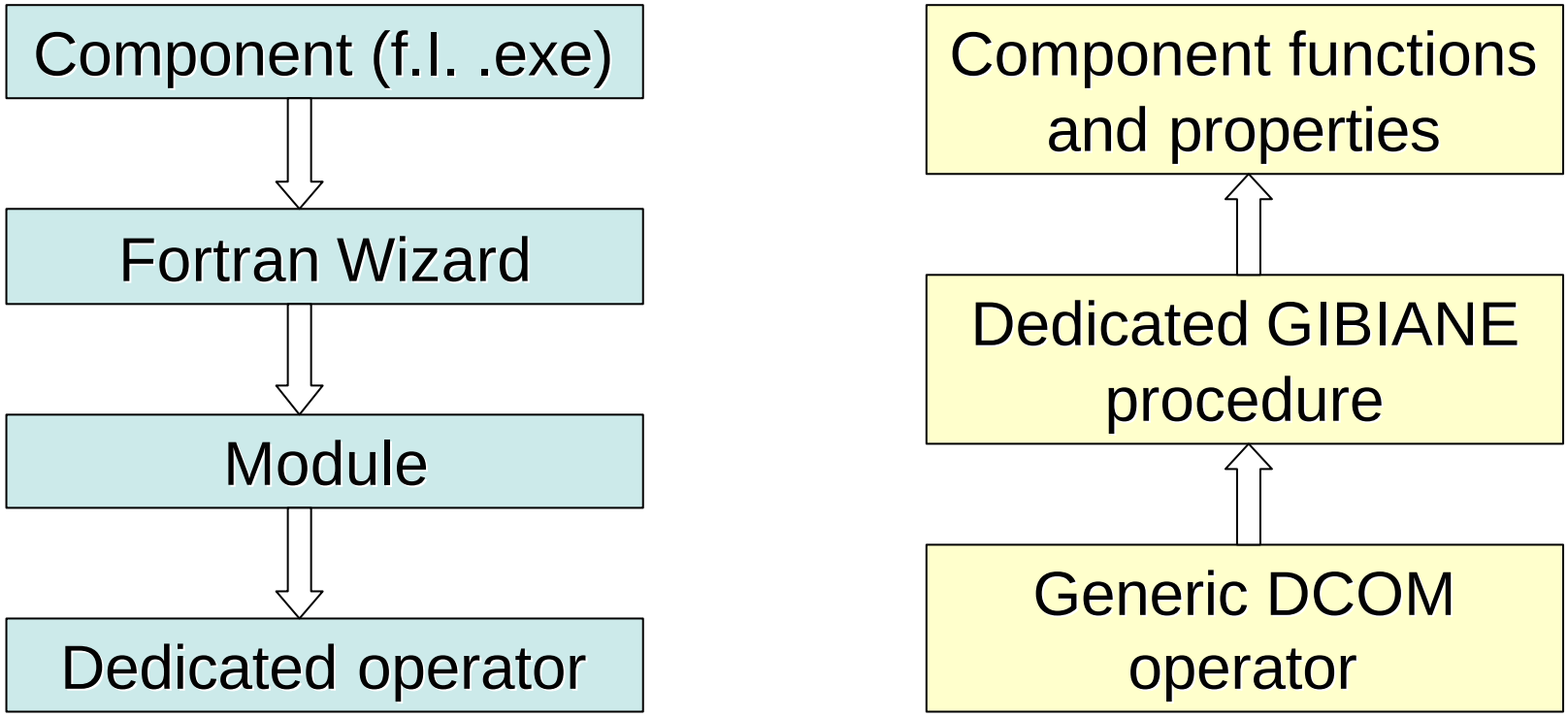
DCOM generic interface: structure of the ELSA database



DCOM generic interface: dedicated or generic interface



DCOM generic interface: DCOM operator

• Create Object	“ServerComponents.Component”	DCOM ‘CREATE’ ….
• Put Properties	“Property Name” “Value”	DCOM ‘PUT_PROP’ ….
• Get Properties	“Property Name” “Value”	DCOM ‘GET_PROP’ ….
• Invoke Functions	“Function Name” “Param”	DCOM ‘INVOKE’ ….
• Release Object		DCOM ‘RELEASE’ ….
• Object Info		DCOM ‘INFO’ ….

DCOM generic interface: database example

```
'DEBPROC' DGet tab1*'TABLE';
*
dcom1='DCOM' 'CREATE' 'AcqCtrlDB.Projects';
'DCOM' 'PUT_PROP' dcom1 'DataSourceName' STR 'ElsaDB';
prj1 ='DCOM' 'INVOKE' dcom1 'GetProject' 'STR' (tab1 . 'Project');
'DCOM' 'RELEASE' dcom1;
*
str1='DCOM' 'INVOKE' prj1 'GetStructure' 'STR' (tab1 . 'Structure');
'DCOM' 'RELEASE' prj1;
*
exp1='DCOM' 'INVOKE' str1 'GetExperiment' 'STR' (tab1 . 'Experiment');
'DCOM' 'RELEASE' str1;
*
post1='DCOM' 'INVOKE' exp1 'GetPostProcessing' 'STR' (tab1 . 'PostProcessing');
'DCOM' 'RELEASE' exp1;
*
sign1='DCOM' 'INVOKE  ' post1 'GetSignal' 'STR' (tab1 . 'Signal');
name1='DCOM' 'GET_PROP' sign1 'Description';
ordo0='DCOM' 'GET_PROP' sign1 'Data';
'DCOM' 'RELEASE' sign1;
*
sign0='DCOM' 'INVOKE  ' post1 'GetSignal' 'STR' '000';
name0='DCOM' 'GET_PROP' sign0 'Magnitude';
absc0='DCOM' 'GET_PROP' sign0 'Data';
'DCOM' 'RELEASE' sign0;
*
res1='EVOL' 'MANU' name0 absc0 name1 ordo0;
*
'DCOM' 'RELEASE' post1;
*
'FINP' res1;
```

```
ans = table;
ans.'Project'='uWalls';
ans.'Structure'='Wall 3';
ans.'Experiment'='w08';
ans.'PostProcessing'='82';
ans.'Signal'='011';
dess (Dget ans);
```