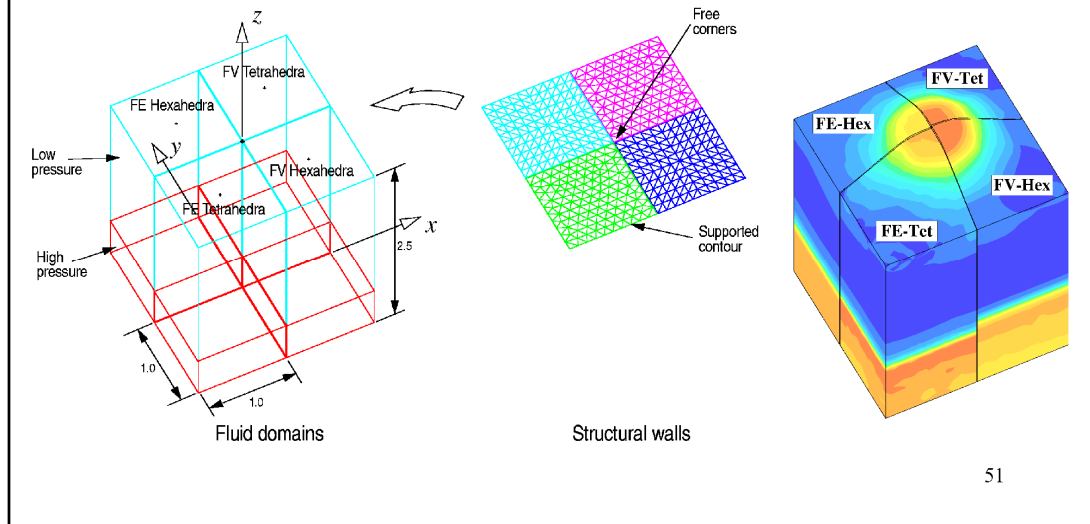


## Exercise/Example 7 : Exfs Test (Comparison FE / FV)



This example is a patch of four shock tubes, each one closed by a deformable plate at one extremity and blocked at the other extremity. The tubes are physically identical to each other but they are discretized in a different manner:

- FE hexahedra
- FE tetrahedra
- FV hexahedra
- FV tetrahedra

The scope of the test is first to show that FE and FV may be mixed up in a single EUROPLEXUS calculation (provided the two sub-domains do not communicate with each other), and second to compare the performance of the different fluid models. Since the tubes are placed side-by-side, visual comparison may be done very effectively.

### Numerical Solutions

#### EXFS13

The EUROPLEXUS input file reads:

```
$-----$
EXFS - Full box - Run for Munich'99 ECCM Conference
$VERI
ECHO
CONV win
CAST FORM MESH
TRID NONL ALE
$-----$
DIME
ZONE 6
PT3L 16389
PT6L 504
NBLE 16389
NMLE 163
MNT1 10
NMF2 253328
ECRO 398076
MC34 18796
MC38 3500
FL38 3400
MTO 504
MTL 840
CL3I 840
TERM
$-----$
GEOM
FL34 EXFETPL AIPETPL
MC34 EXFETMC AIPETMC
FL38 EXFETPL AIPETPL
MC38 EXFETMC AIPETMC
COQI WALTPL WALTMC WALHPL WALHMC

CL3I PIMP
TERM
$-----$
GRIL
LAGR LECT WALTPL WALTMC WALHPL WALHMC TERM
ALE LECT EXFETPL AIPETPL EXFETMC AIPETMC EXFETPL AIPETPL EXFETMC
AIPETMC TERM
AUTO AUTR
$-----$
BPAL 2.5e-3 LECT WALTPL WALTMC WALHPL WALHMC TERM
$-----$
MATE
$
$... ( STRUCTURE ) ...
VME3 RO 5000. YOUN 1.0E09 MU 0.3 ELAS 1.0E09
TRAC 1 1.0E+09 1.0E+00
LECT WALTPL WALTMC WALHPL WALHMC TERM
$
$... ( FLUID ) ...
$ (Volume of the 4 high-energy zones: Vol=.5448 m^3)
$
$ ----- Flut material -----
$
$ High energy zone
FLUT RO 2. EINT 5.E5 GAMM 1.5 PB 0 ITER 1 ALFO 1 BETO 1
KINT 0 AHGF 0 CL 0.0 CQ 2.00 PMIN 0 NUM 1
LECT EXFETPL EXFETPL TERM
$ Low energy zone
FLUT RO 2. EINT 1.E5 GAMM 1.5 PB 0 ITER 1 ALFO 1 BETO 1
```

```

KINT 0 AHGF 0 CL 0.0 CQ 2.00 PMIN 0 NUM 1
LECT AIFETPL AIFEHPL TERM
$
$ ----- Mccp material -----
$
MCCP MCOM 1 R 10000
COMP 'Oxigen1' PM 20. CV1 20000 CV2 0 CV3 0
LECT EXFETMC AIFETMC EXFEHMC AIFEHMC TERM
$
$ ----- Imposed Pressure -----
$
IMPE PIMP RO 1.0 PREF 0.0 PRES 1.0E5
TABP 2 0.0 1.0 1.0 1.0
LECT PIMP TERM
$
$-----
INIT MCOM
COMP 'Oxigen1' MPRA 1.0
LECT EXFETMC AIFETMC EXFEHMC AIFEHMC TERM
PRES 1.E5 LECT AIFVTMC AIFVHMC TERM
PRES 5.E5 LECT EXFVTMC EXFVHMC TERM
TEMP 100. LECT AIFVTMC AIFVHMC TERM
TEMP 500. LECT EXFVTMC EXFVHMC TERM
$-----
OPTI FSCR
LINK COUP BLOC 1 LECT bloc1 TERM
2 LECT bloc2 TERM

3 LECT bloc3 TERM
123 LECT blocall TERM
CONT SPLA NX 1 NY 0 NZ 0 LECT symx TERM
CONT SPLA NX 0 NY 1 NZ 0 LECT symy TERM
PSA LECT fsan TERM
$-----
ECRI
fich form spli k200 TFRE 1.e-3
poin tous
vari depl vite mxxx ecro ecrc lect 1 2 4 term
STRAC FORM IDEA TFRE 1.e-3
$VARI DEPL MCVA FLVA
$POIN LECT LAGR TERM
$SELM LECT WALITPL WALITMC WALHFL WALHMC TERM
$
TRAC TPLO TFRE 25.E-6 DESC 'EXFS13'
POIN LECT TPLNTPL TPLNTMC TPLNHFL TPLNHMC TERM
$-----
OPTI NOTE
OPTI MC ORDR 2 LOG 1
REZO GAMO 0.5 LIAI MVRE MODU
csta 0.5
$-----
CALC TINI 0 TEND 20.E-3
$-----
FIN
$-----

```

Some results: pressure distributions:

