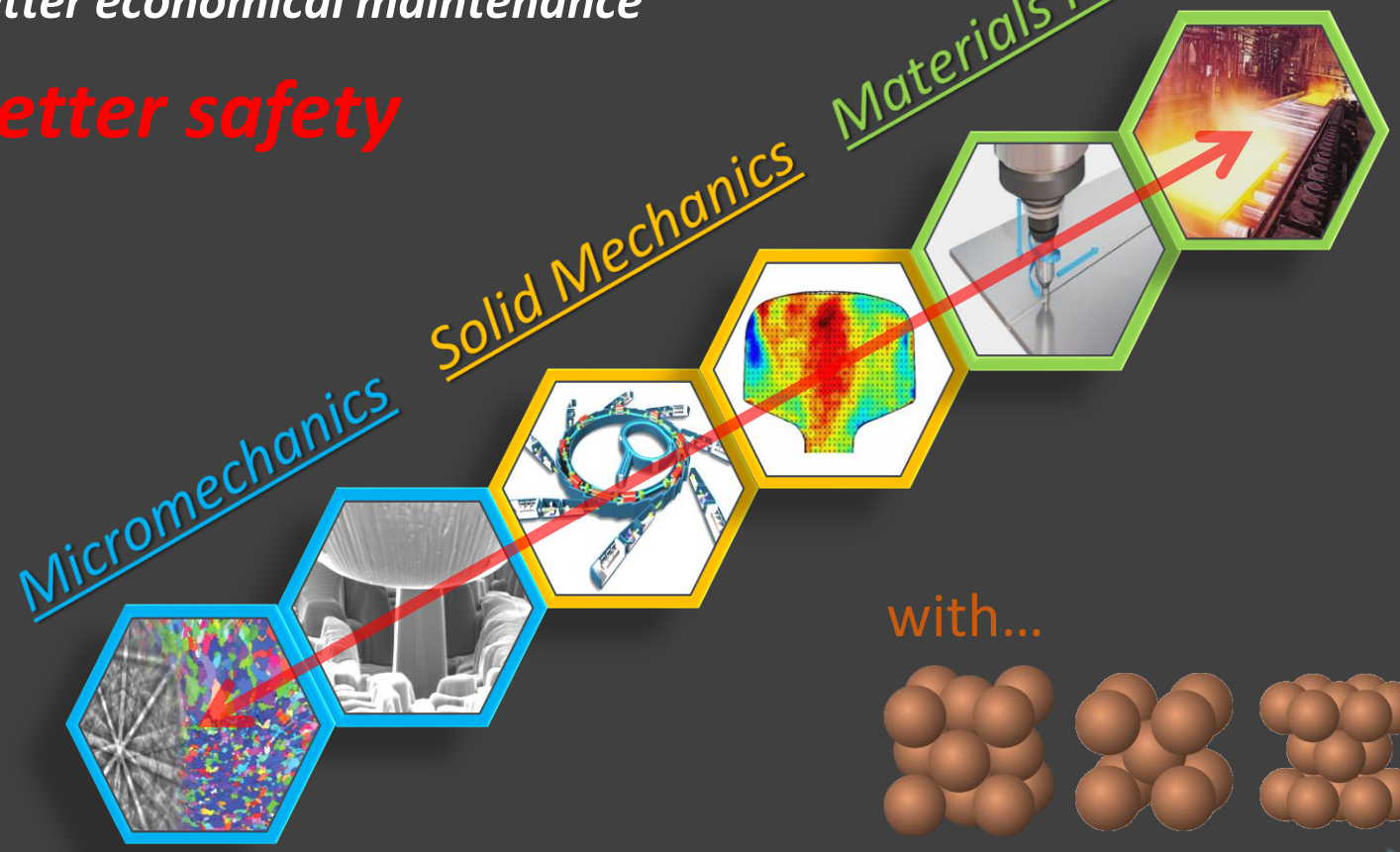
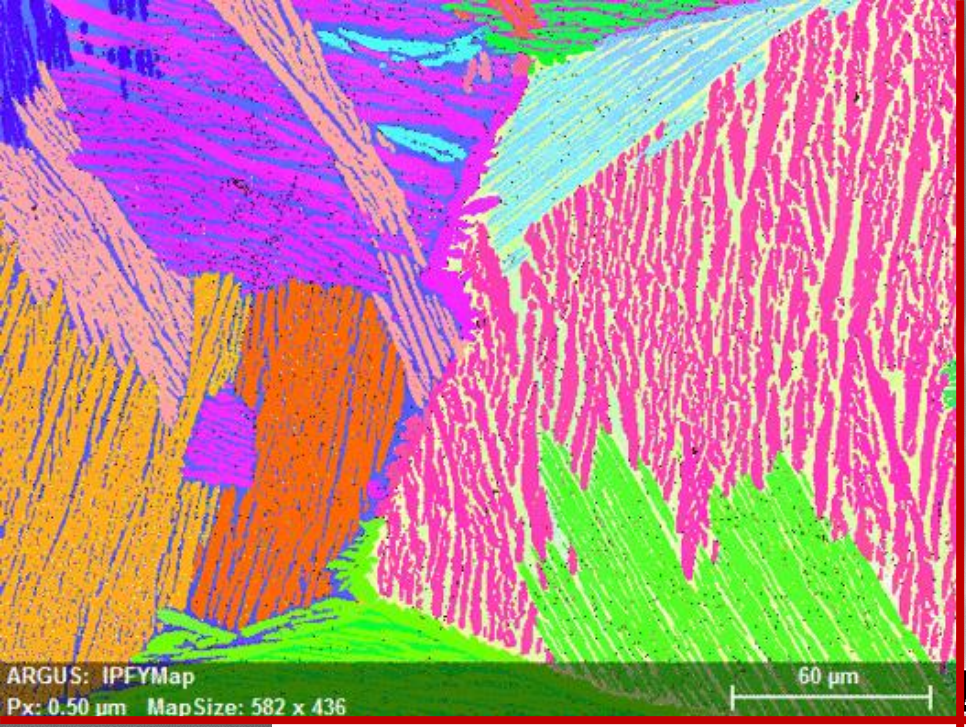
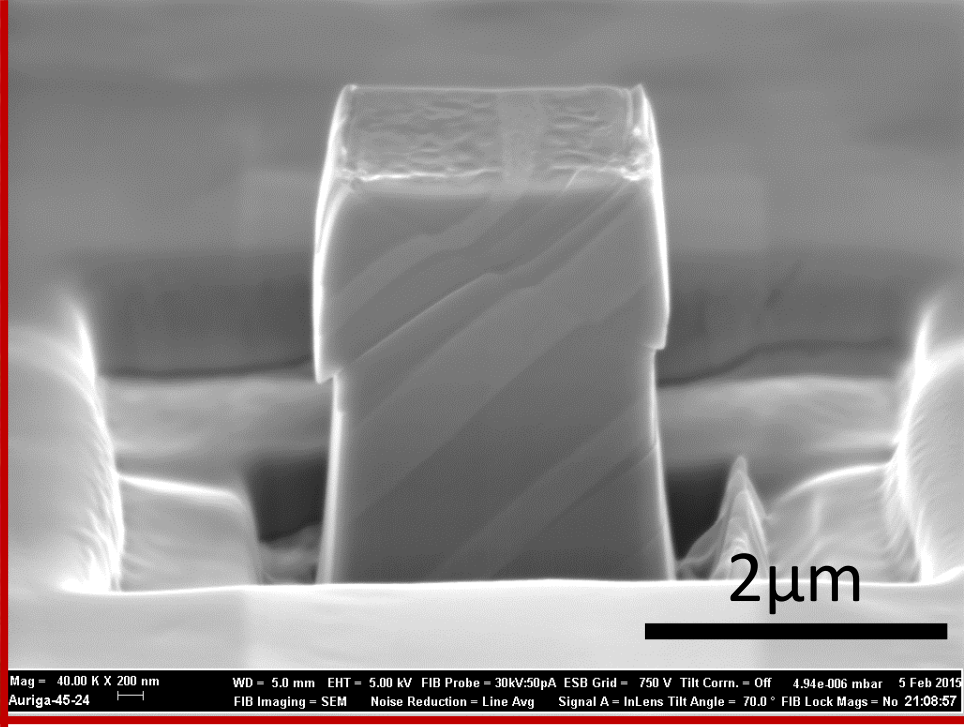
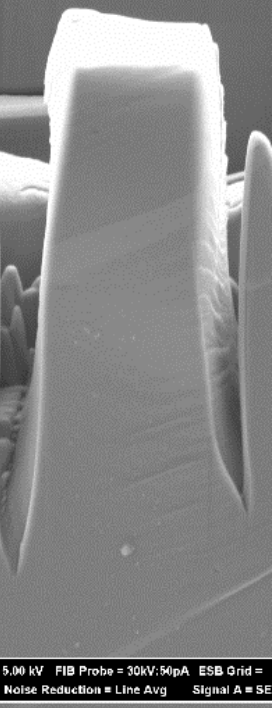
Fundamental Science to Practical Engineering

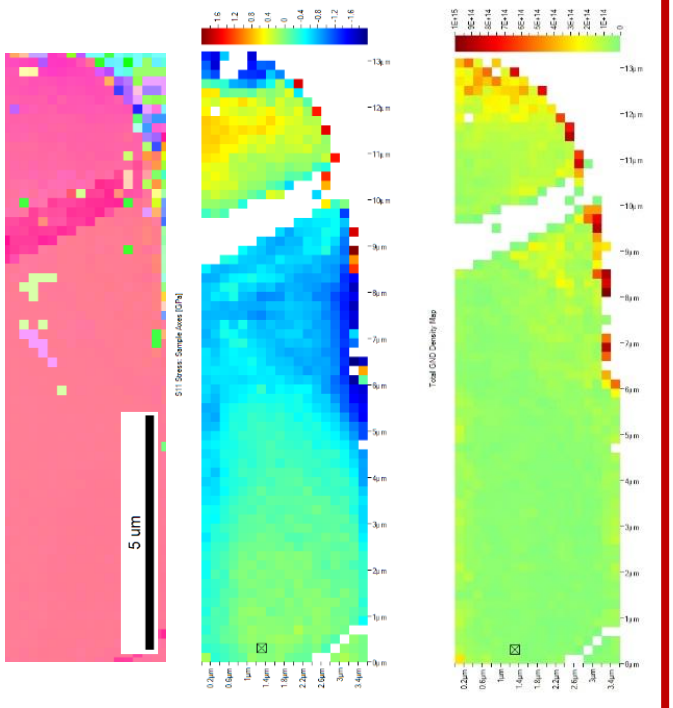
- ➔ *Better mechanistic understanding on materials*
- ➔ *Better design for component and processing*
- ➔ *Better economical maintenance*
- ➔ ***Better safety***

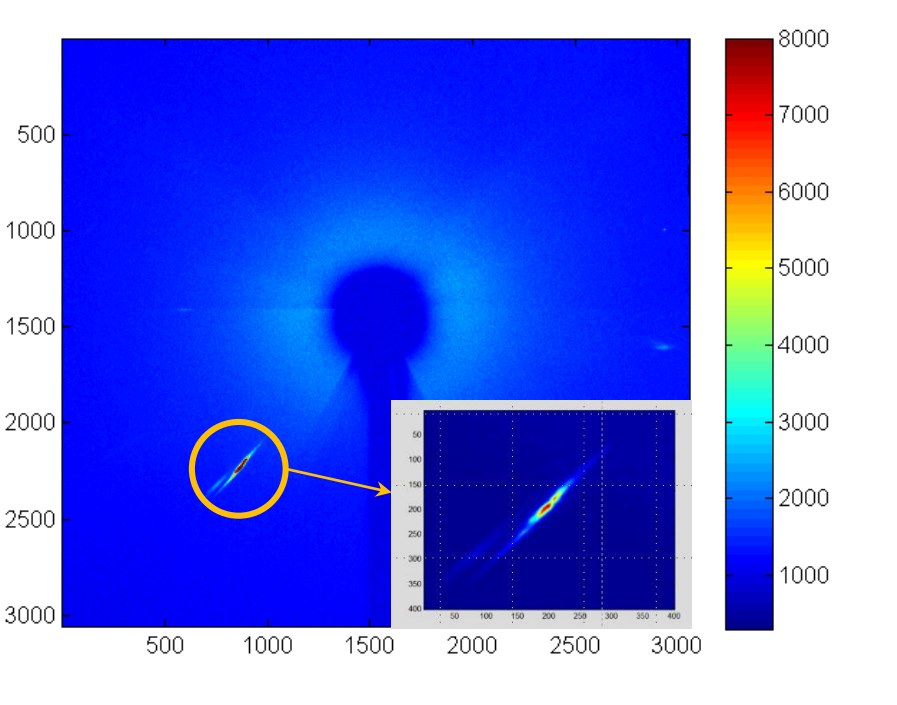


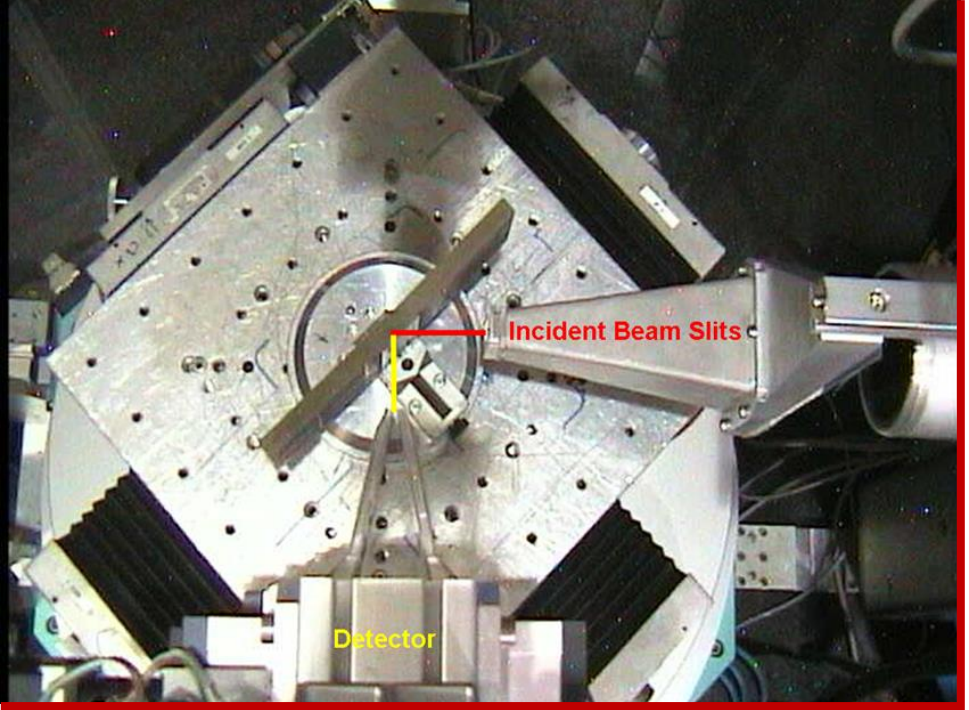

ARGUS: IPFYMap
Px: 0.50 µm MapSize: 582 x 436
60 µm

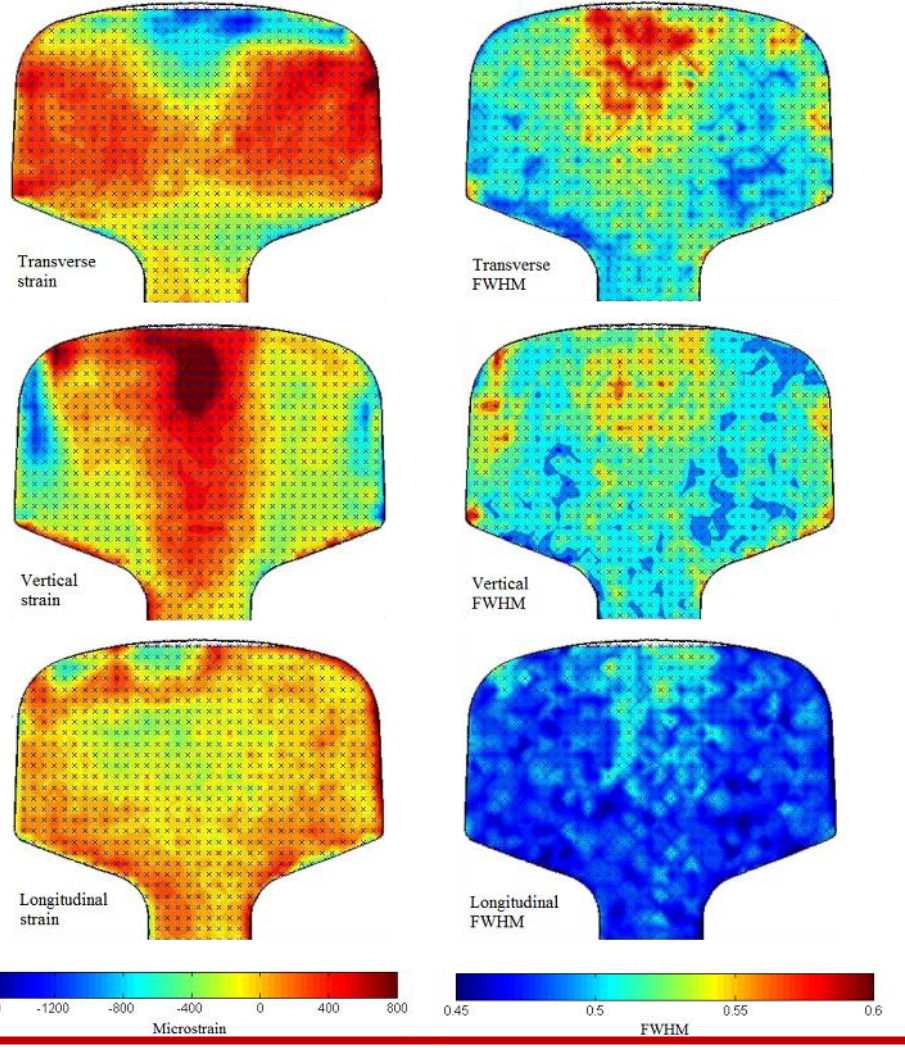

2µm
Mag = 40.00 K X 200 nm
Auriga-45-24
WD = 5.0 mm EHT = 5.00 kV FIB Probe = 30kV:50pA ESB Grid = 750 V Tilt Corrn. = Off 4.94e-006 mbar 5 Feb 2015
FIB Imaging = SEM Noise Reduction = Line Avg Signal A = InLens Tilt Angle = 70.0 ° FIB Lock Mags = No 21:08:57

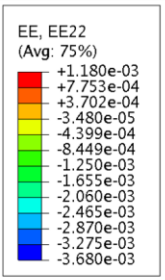

5.00 kV FIB Probe = 30kV:50pA ESB Grid =
Noise Reduction = Line Avg Signal A = SE

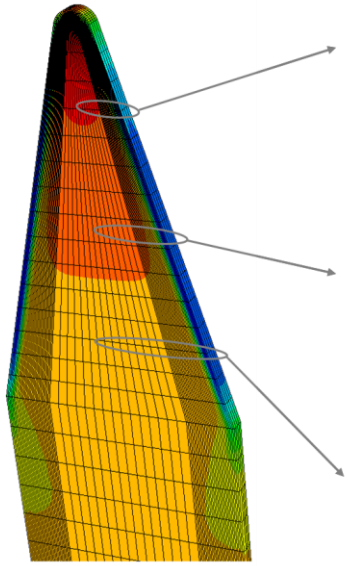

5 um

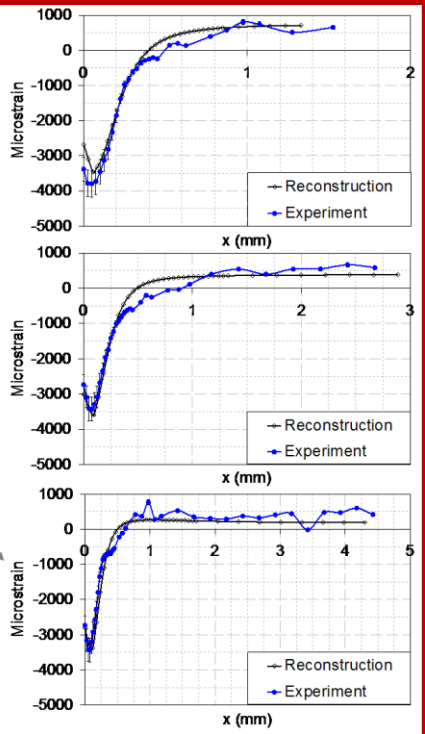

500
1000
1500
2000
2500
3000
8000
7000
6000
5000
4000
3000
2000
1000

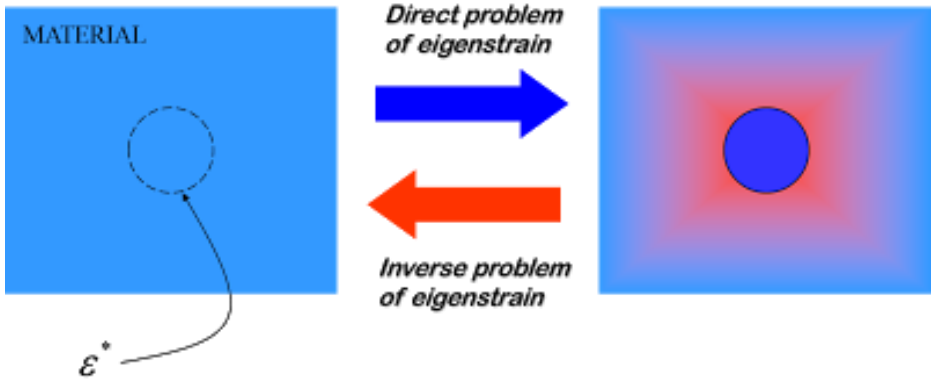

Incident Beam Slits
Detector


Transverse strain
Transverse FWHM
Vertical strain
Vertical FWHM
Longitudinal strain
Longitudinal FWHM
-1600 -1200 -800 -400 0 400 800
Microstrain
0.45 0.5 0.55 0.6
FWHM

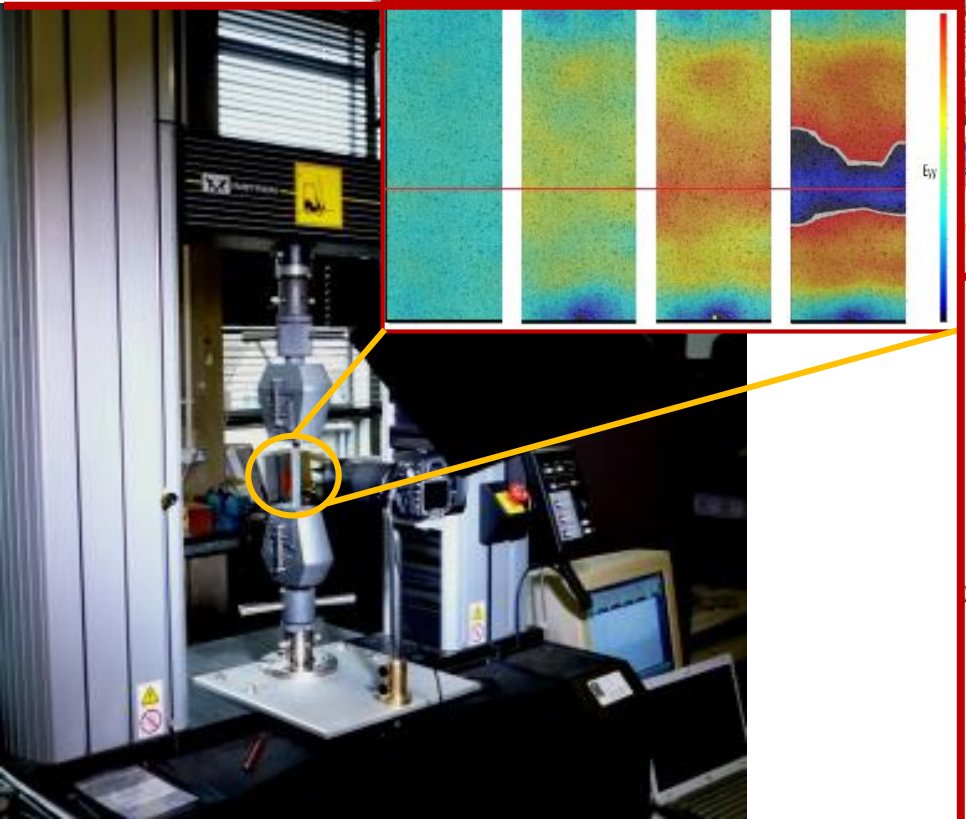

EE, EE22
(Avg: 75%)
+1.180e-03
+7.753e-04
+3.702e-04
-3.480e-05
-4.399e-04
-8.449e-04
-1.250e-03
-1.655e-03
-2.060e-03
-2.465e-03
-2.870e-03
-3.275e-03
-3.680e-03


2
1
3

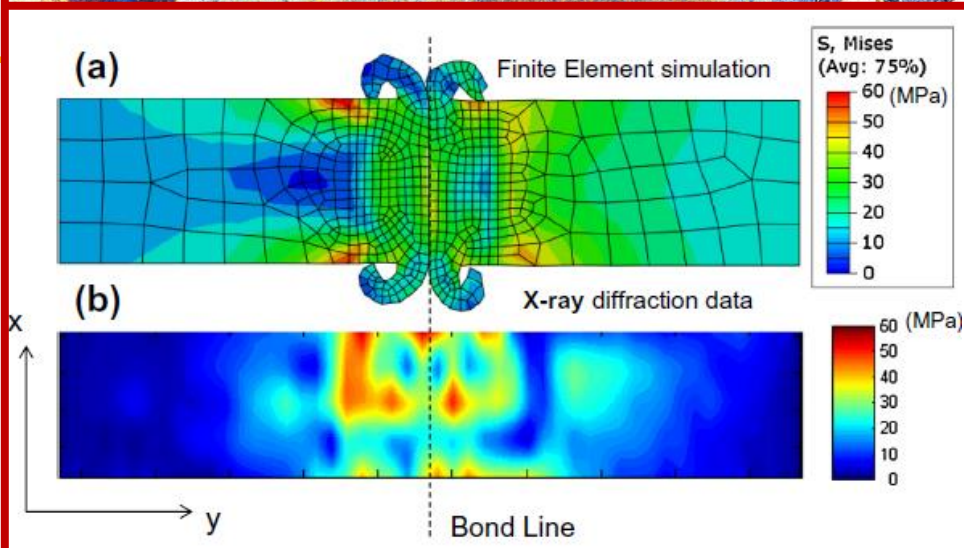

Microstrain
x (mm)
Reconstruction
Experiment


MATERIAL
Direct problem of eigenstrain
Inverse problem of eigenstrain
ε^*


HAZ
TMAZ
Weld centre
TMAZ
HAZ
2.5 mm



ε_{yy}


(a)
Finite Element simulation
S, Mises
(Avg: 75%)
60 (MPa)
50
40
30
20
10
0
(b)
X-ray diffraction data
60 (MPa)
50
40
30
20
10
0
x
y
Bond Line