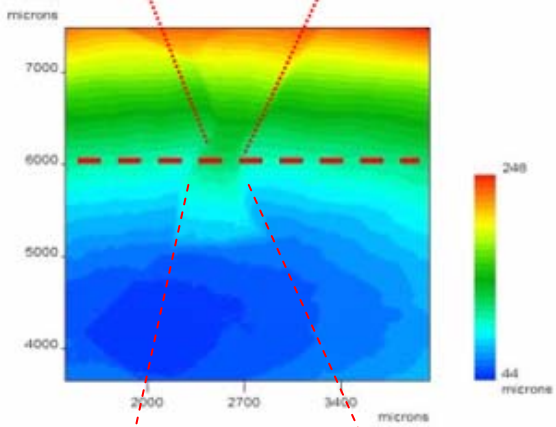
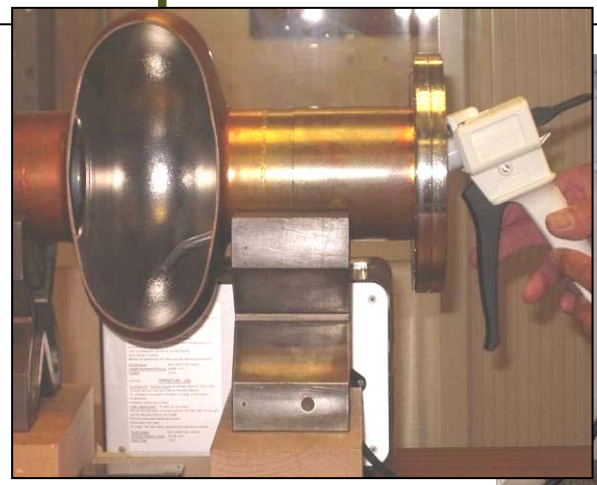
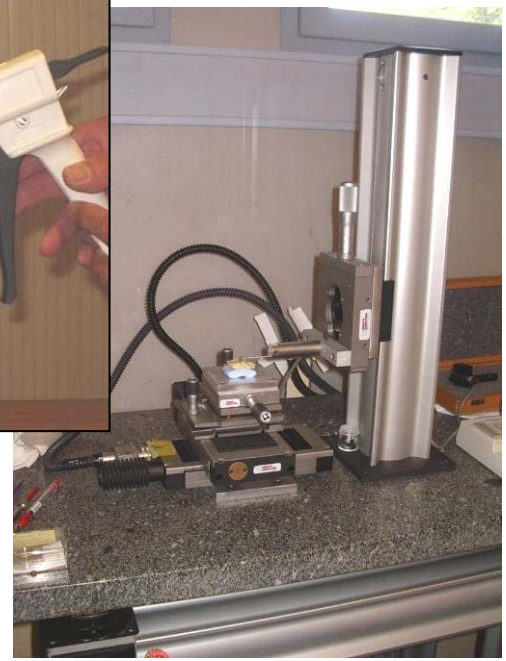
Replica @ the quench site…

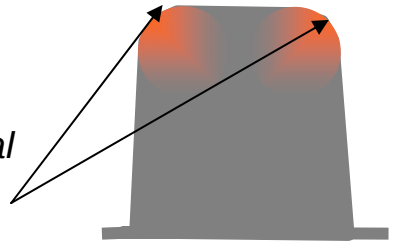


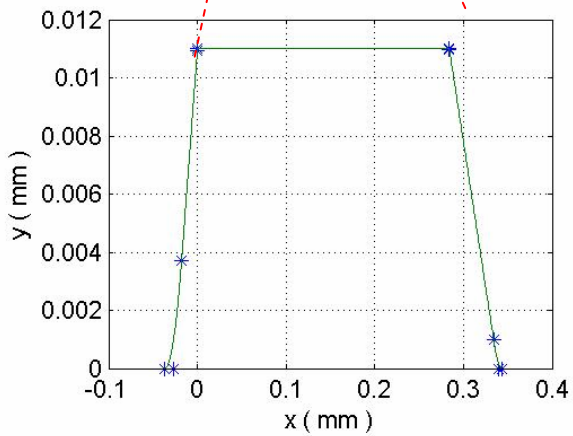
Size of the defect ~ → 550 µm x ↑ 15 µm



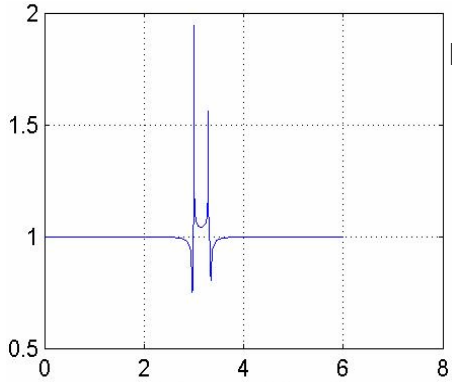


Normal cond.





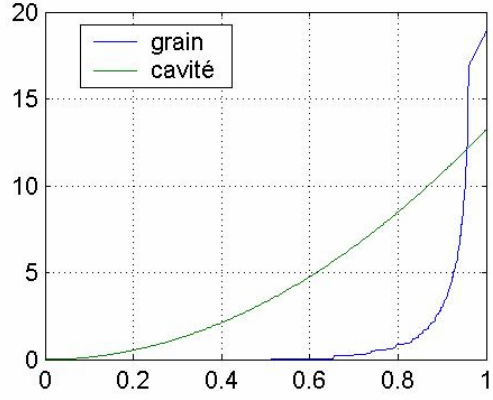
H/<H>



x (mm)

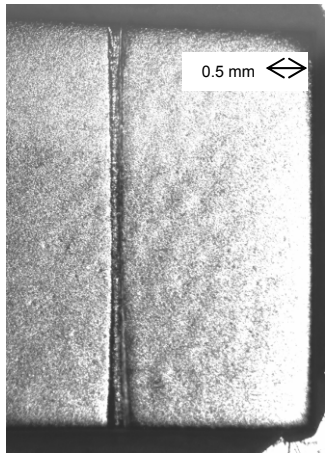
P (W)

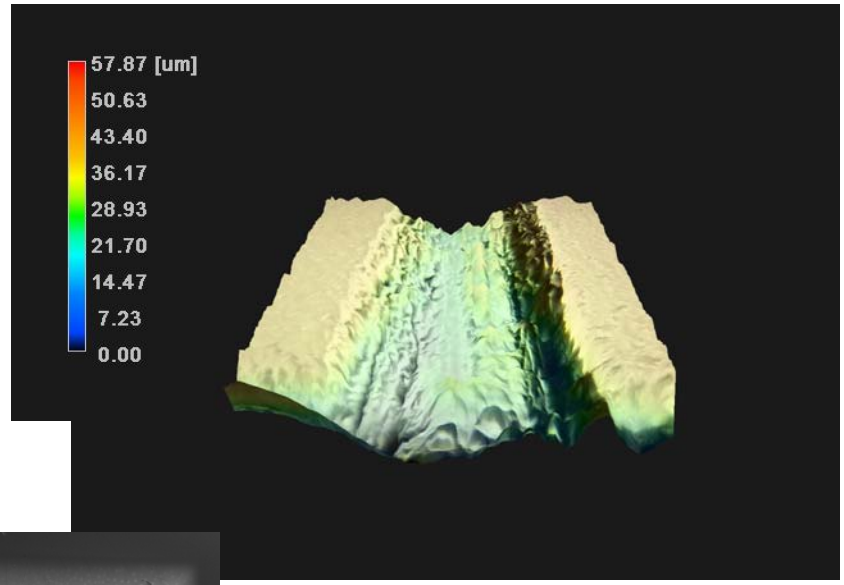
Dissipated power (Rs ~ 2mΩ)

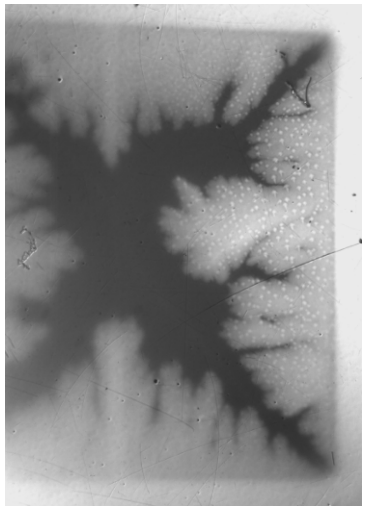


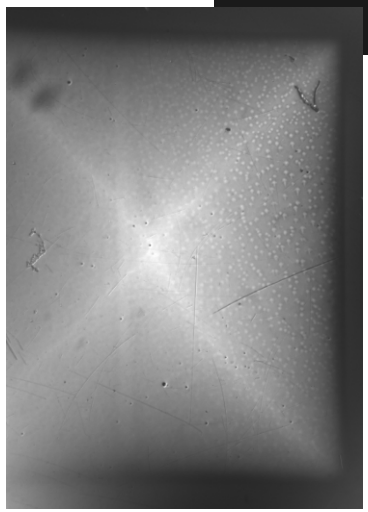
H/H_c

Single crystal with artificial defect (notch) on the surface









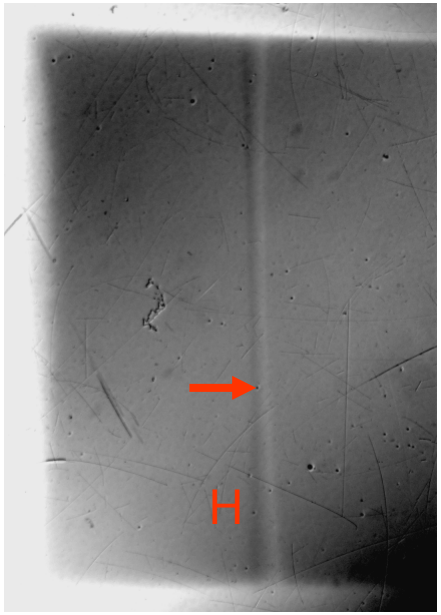
#52 ZFC H=40 mT T=7K

#62 Remn H=80 mT T=7K

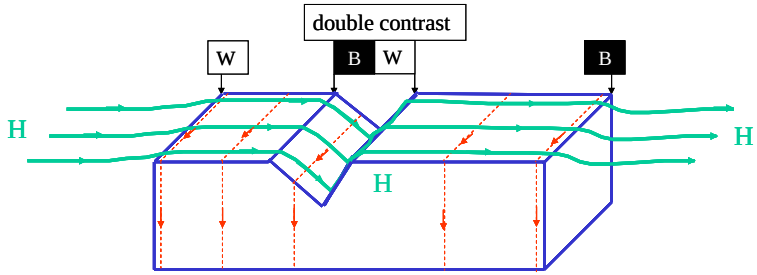
[A. Polyanskii et al, WU/FSU]

- H ⊥ surface: notch has small impact on flux distribution even at higher T

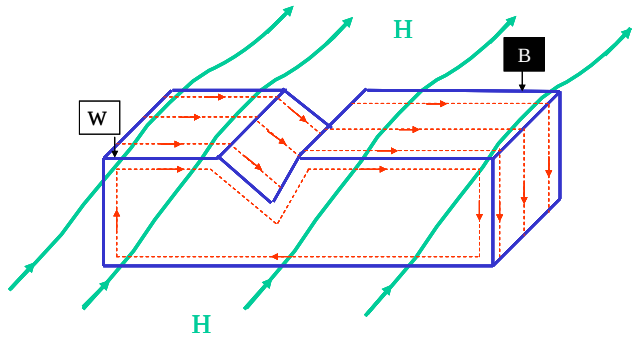
Single crystal with notch on the surface : H // surface



T=5.6K



MO contrast is double at the groove, when in-plane field perpendicular to groove

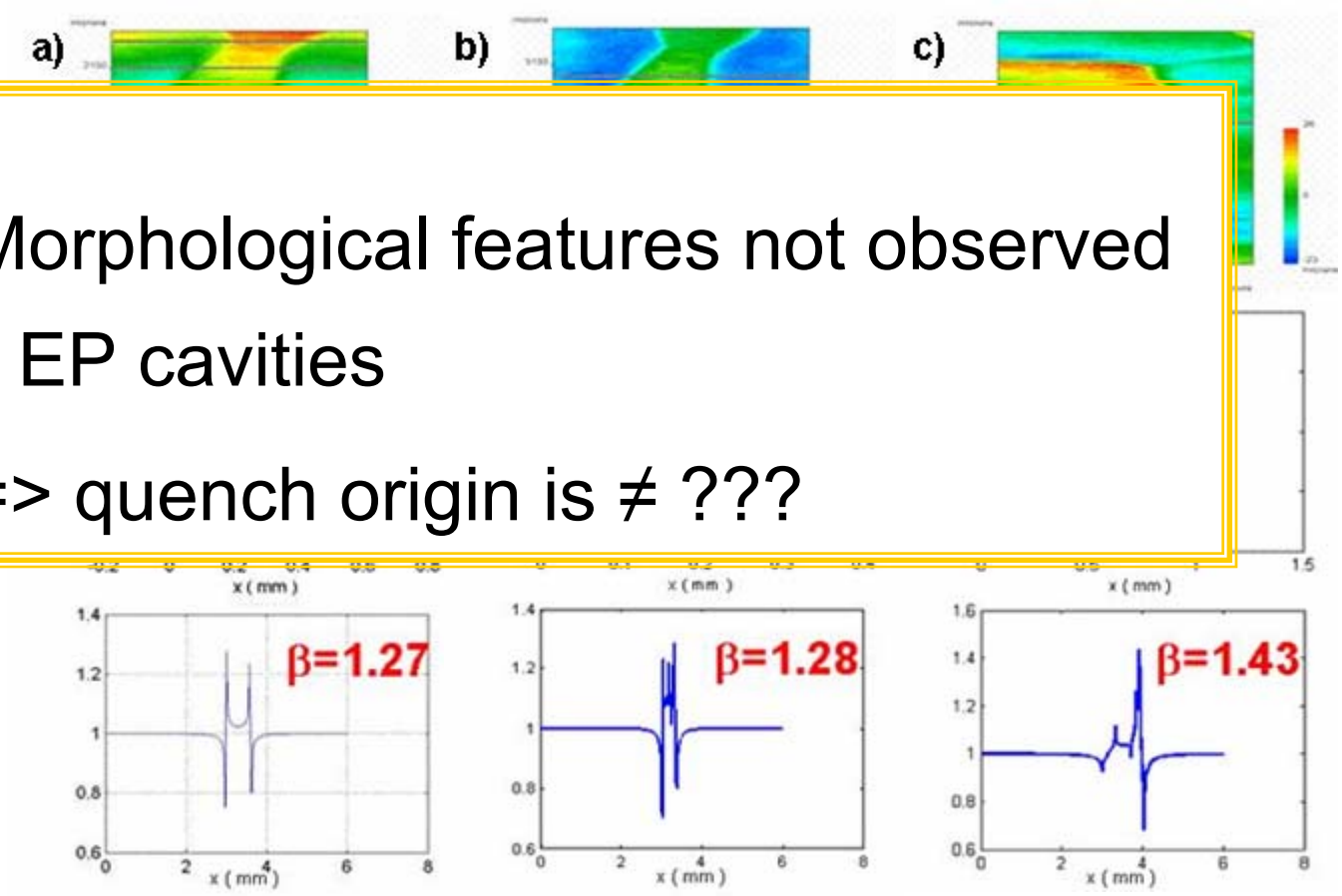


No MO contrast at the groove, when in-plane field parallel to groove

Morphological effect … Roughness

Replica @ the quench site

a) *first quench site,*
b) *same area after 20 µm (quench site @ a new location)*
c) *new quench location.*



Contour lin

Modeling profile

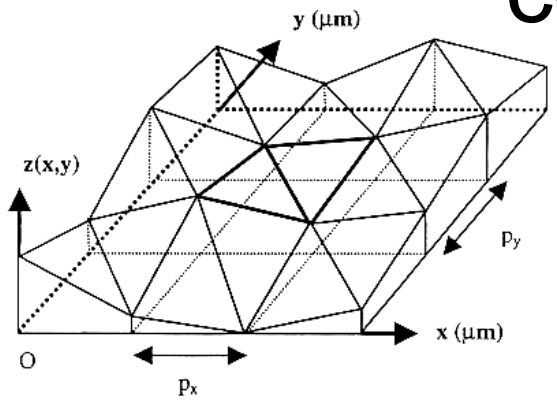
β (field enhancement factor)

- Morphological features not observed on EP cavities
- => quench origin is ≠ ???

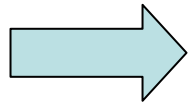
Local morphology is consistent for explaining the quench

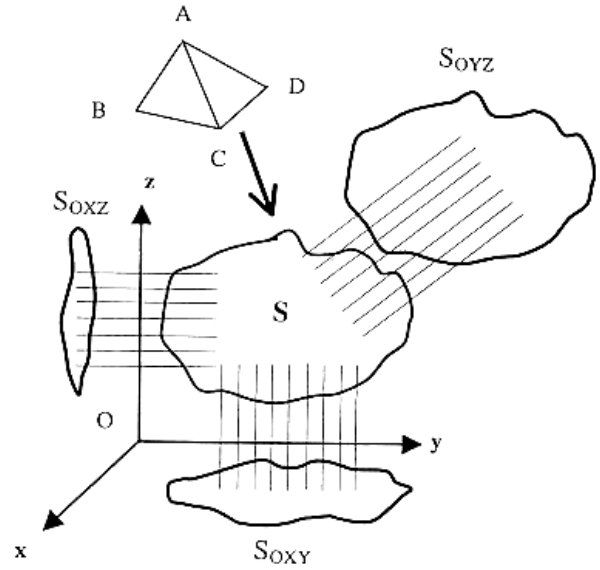
2D model => need to go to 3D model

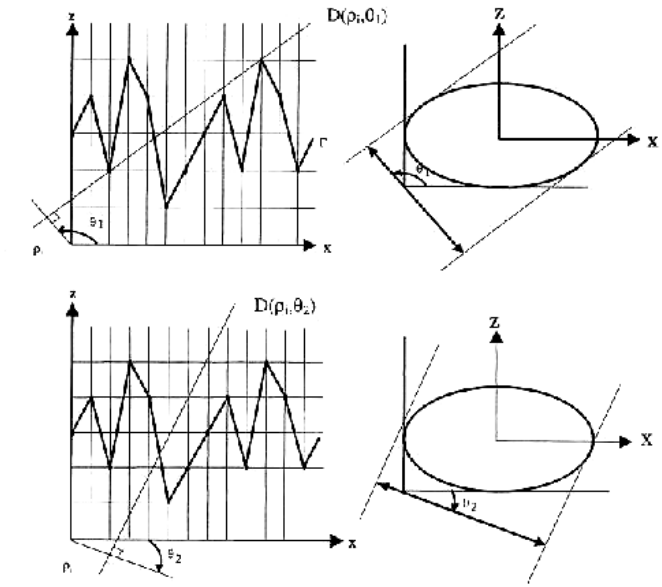
« conformal equivalent structure » concept

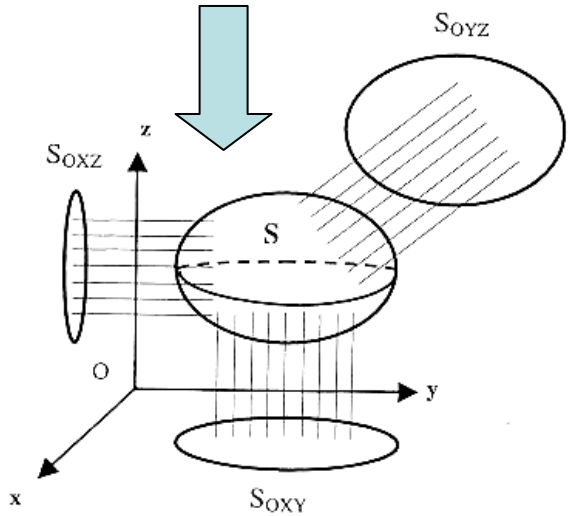


1. Decomposition of a sampled surface into elementary segments mode) or elementary micro-triangles (3D mode).









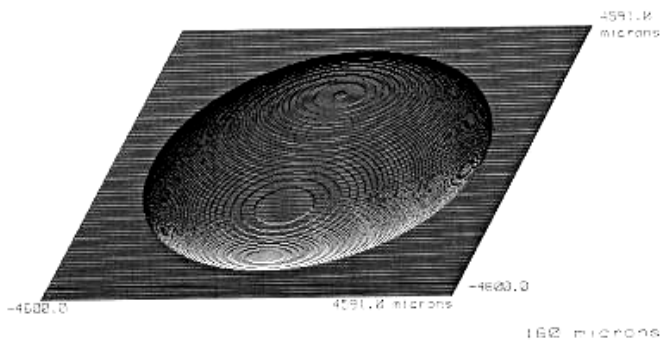
Works with 1! Defects or many.

On Nb samples

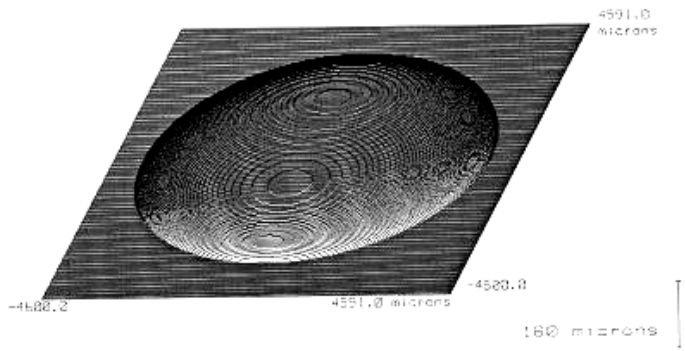
a) Annealed ~ 1 grain

b) not annealed ~ 15 grains

EP

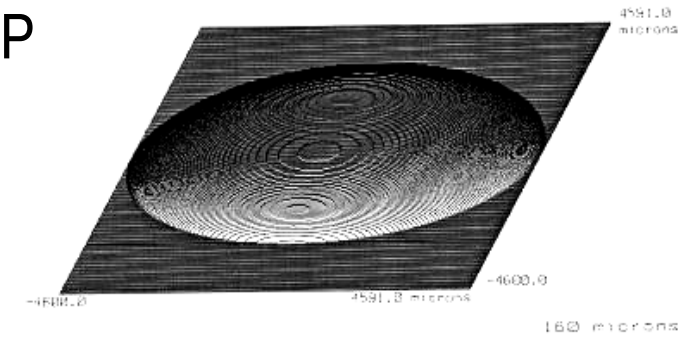


7R.A-EP recuit

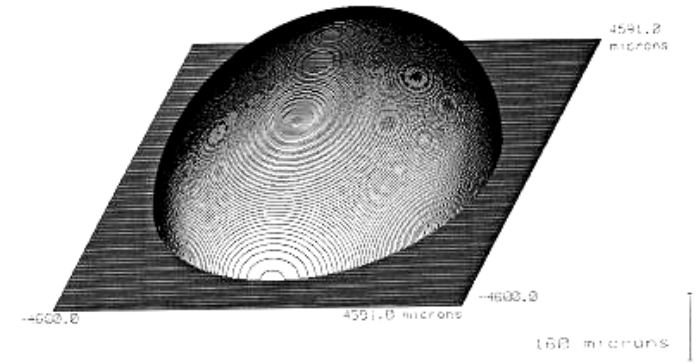


7B-EP non recuit

BCP



1R.A-FNP recuit



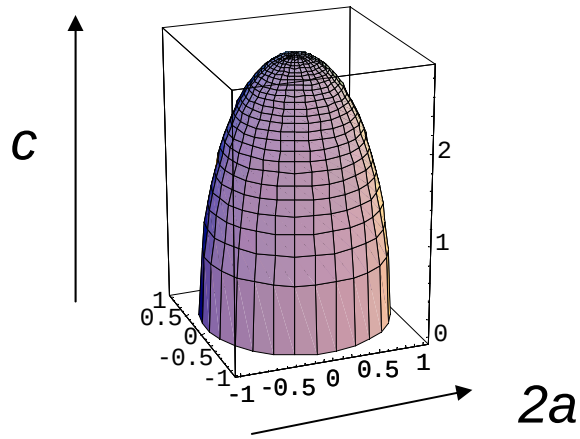
7F-FNP non recuit

a)Annealed material with grain ∅ ~ 1-2 mm
b) Small grain material with ∅ ~ 70 μm

Demagnetization factor

$$D_a = \frac{1}{1-m^2}\left\{1 - \frac{m}{\sqrt{1-m^2}}\arccos m\right\}$$

$m=a/c$



parameter	Small grain material a)	out of welding seam b)	Welding seam	Bulge 50µm high, 200µm Φ
Ra	1-2 µm	4-8 µm	40-80 µm	
C	~ 300	~ 90-100	~ 350	
C/A	~ 0,085	~ 0,024	~ 0,085	~ 0.5
β=1/(D)	1,065	1,028	1,4 *	**1.9 !!!!**
Φ grains	70 µm	1-2 mm	0,5-1 cm	

**Same order of magnitude Jens calculation/individual grain /mean value in the welding seam*