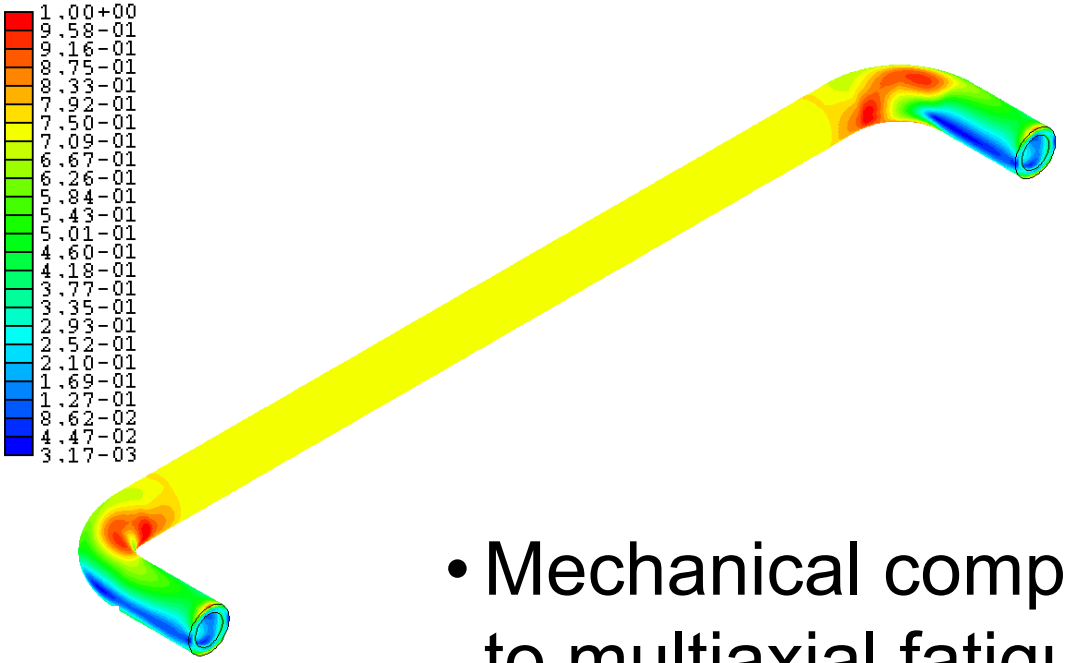
Exploitations



- Mechanical components subjected to multiaxial fatigue (*in-phase*);
- high strength steels;
- planar defects (**new problems and tools**)

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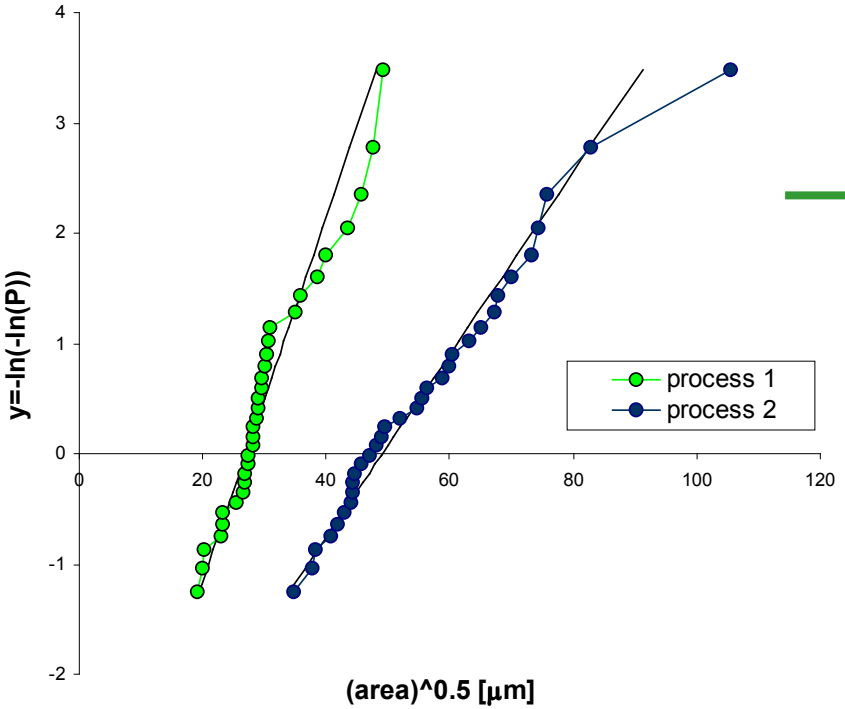
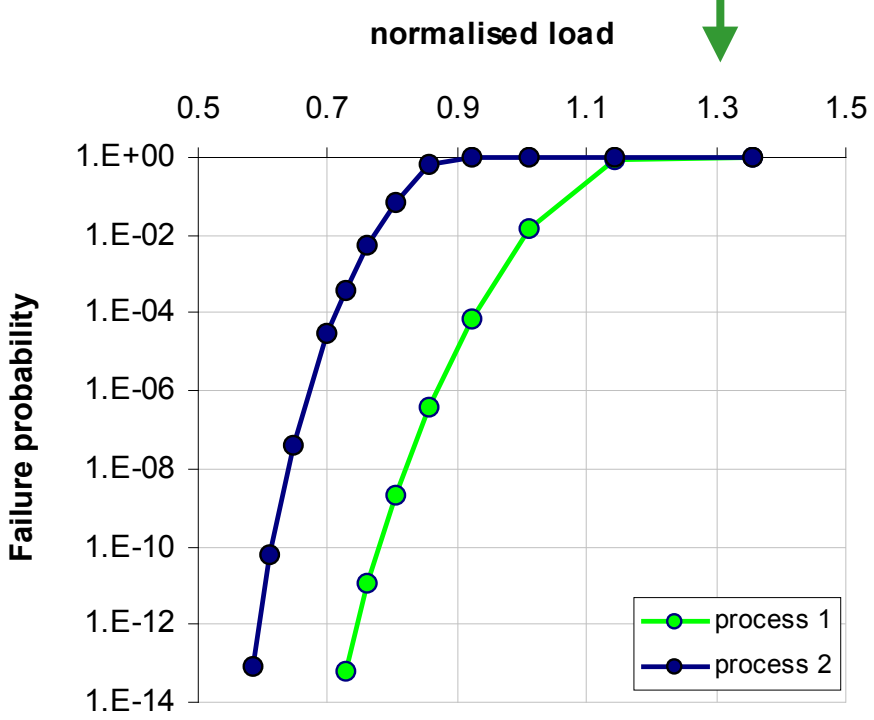
Exploitations



With the previous WL model it was possible to compare the outcome of the two processes



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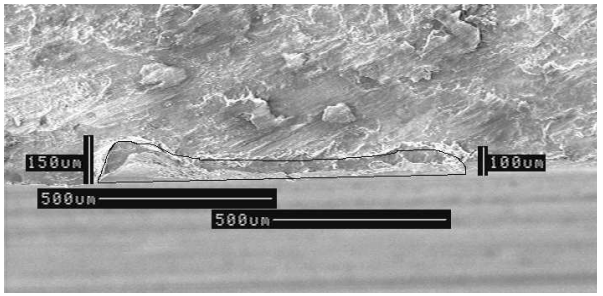
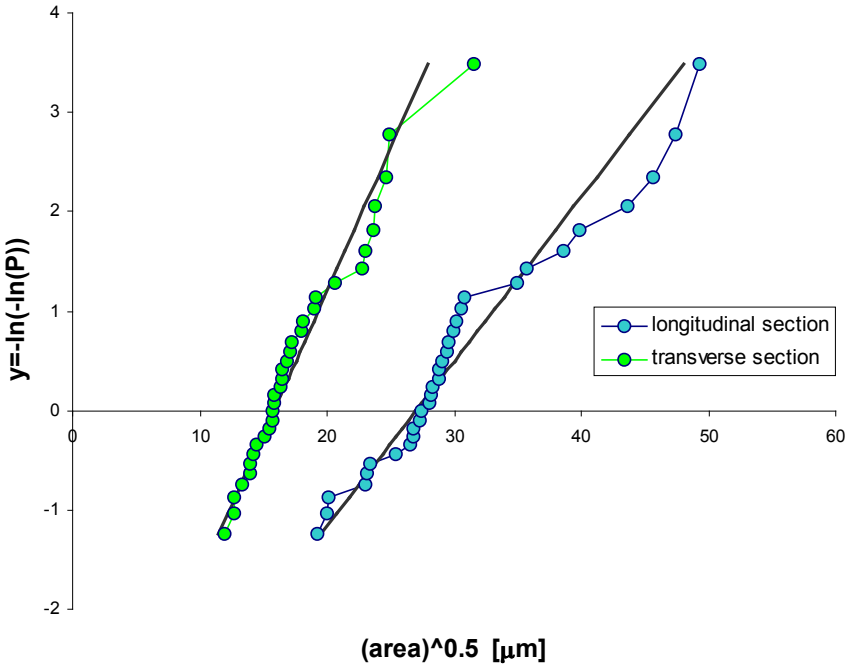
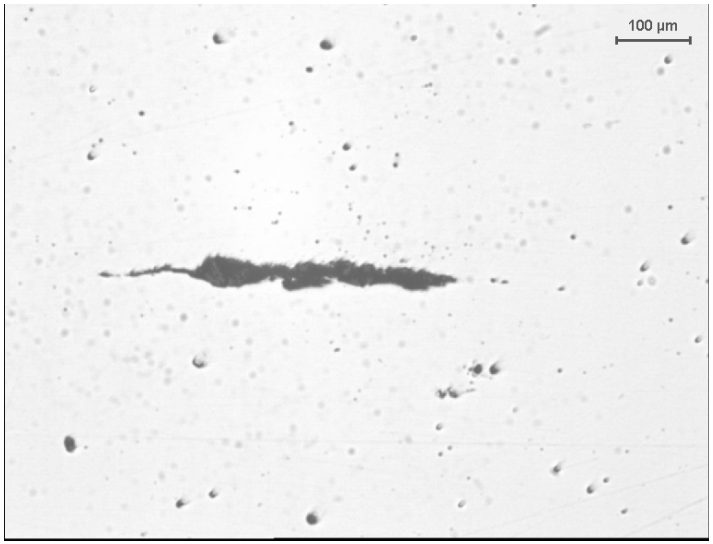
Defects

Surface inhomogeneities:



Inclusions:





Unfortunately they are not spheroidal at all !!

Elongated inclusions

can we predict the maximum defect in a volume ?

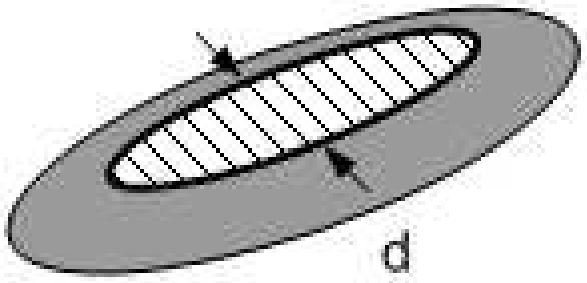
$$x(T) = \lambda + \delta \cdot \left\{ -\ln\left[-\ln\left(1 - \frac{1}{T} \right) \right] \right\} \qquad T = \frac{V}{V_0}$$

Murakami's simple rule

$$V_0 = h \cdot S_0 \qquad h = \frac{\sum_{i=1}^{N} x_i}{N}$$

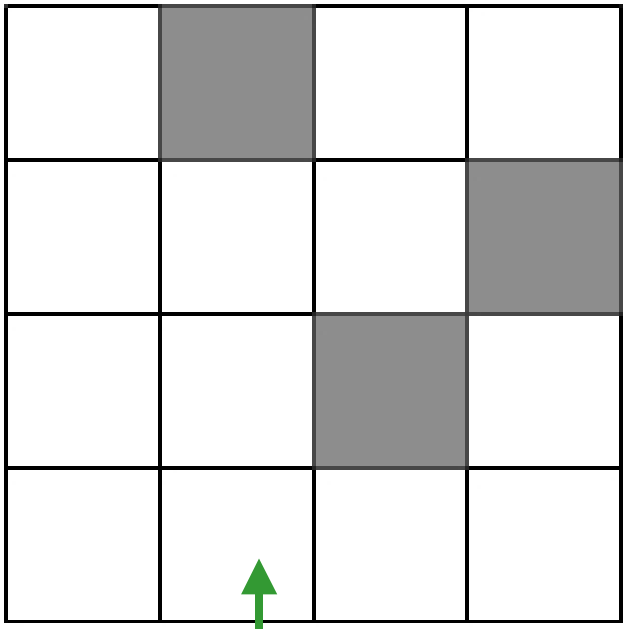
Ellipsoidal shape:
by simulation it was possible to correct it into

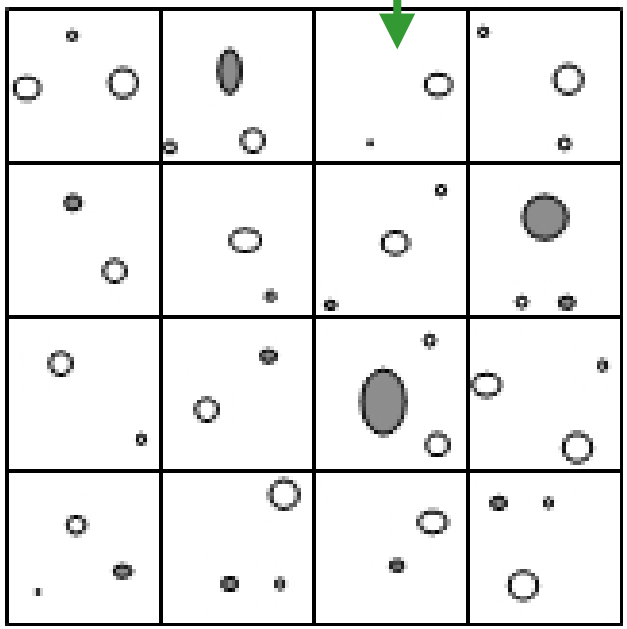
$$h = \frac{\sum_{i=1}^{N} d_i}{N}$$



Presence of different particles

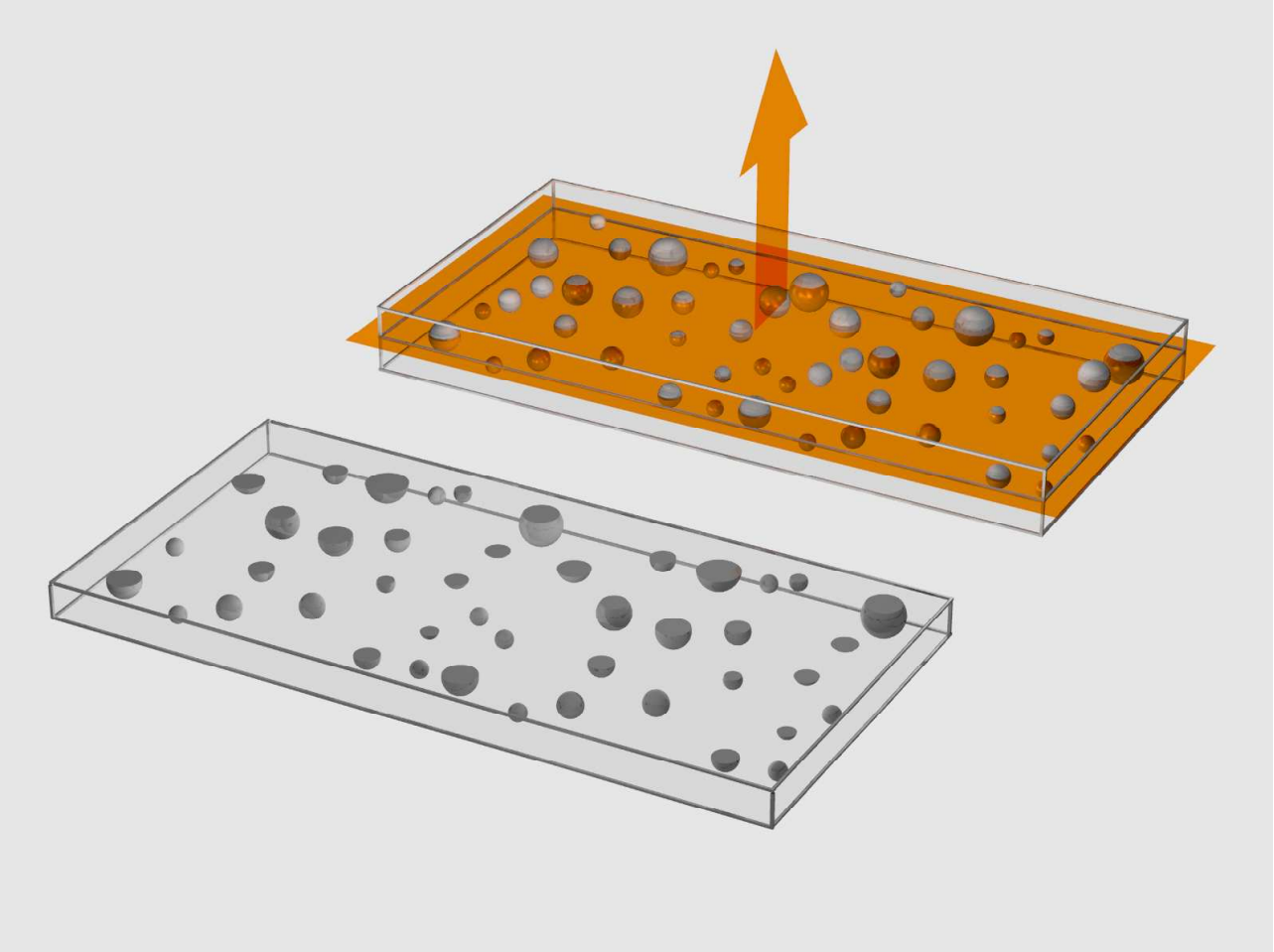
$$F(x)_{competing\ risks} = F_1(x,\lambda_1,\delta_1)\cdot F_2(x,\lambda_2,\delta_2)$$



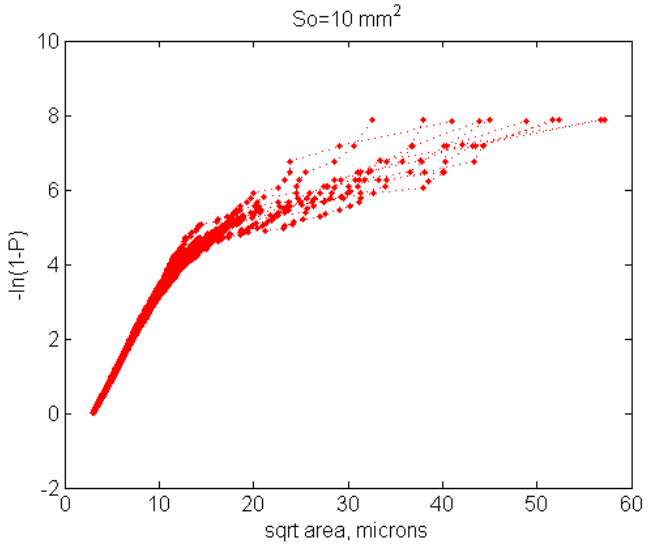


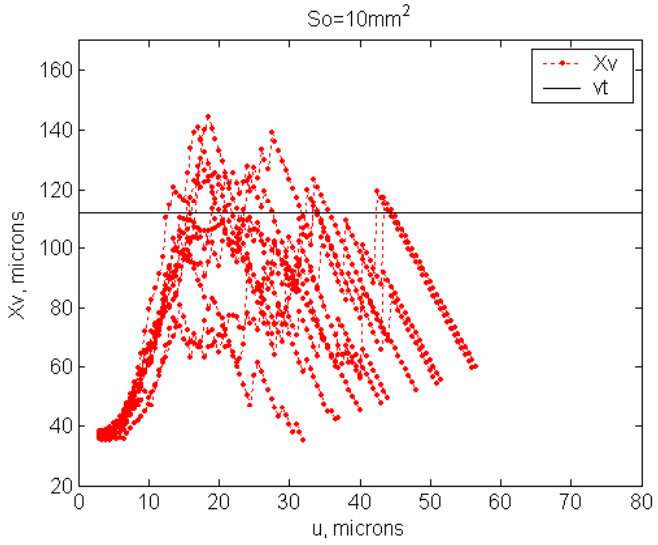
$$F(x)_{mix} = (1-P)\cdot F_1(x,\lambda_1,\delta_1) + P\cdot F_2(x,\lambda_2,\delta_2)$$

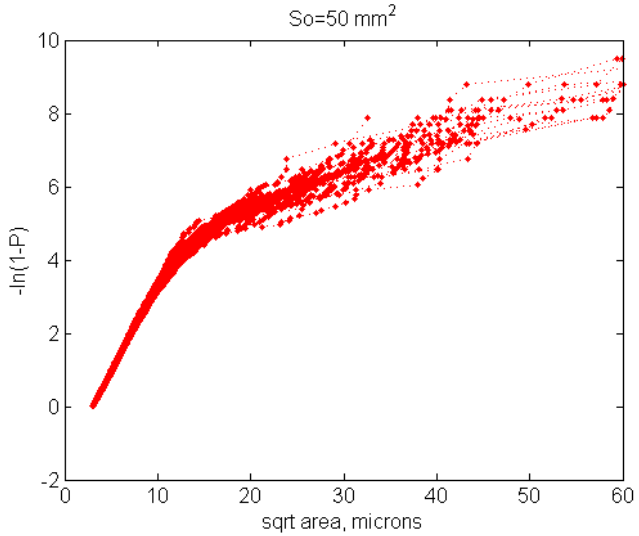
Presence of different particles:
simulation of sectioning

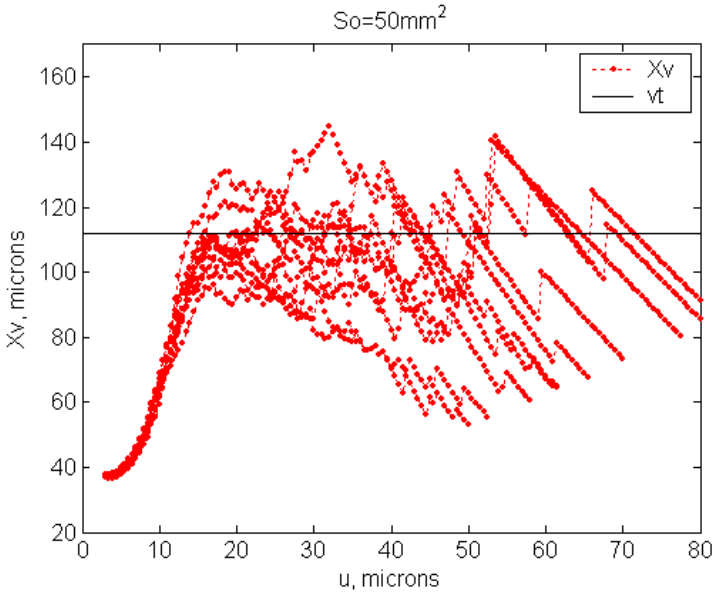


Treatment with POT









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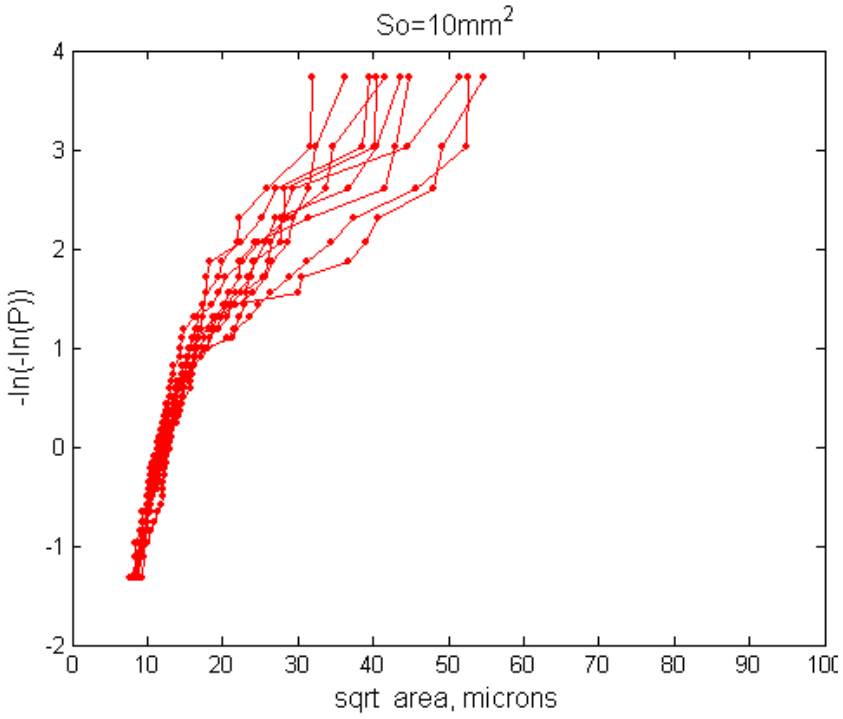
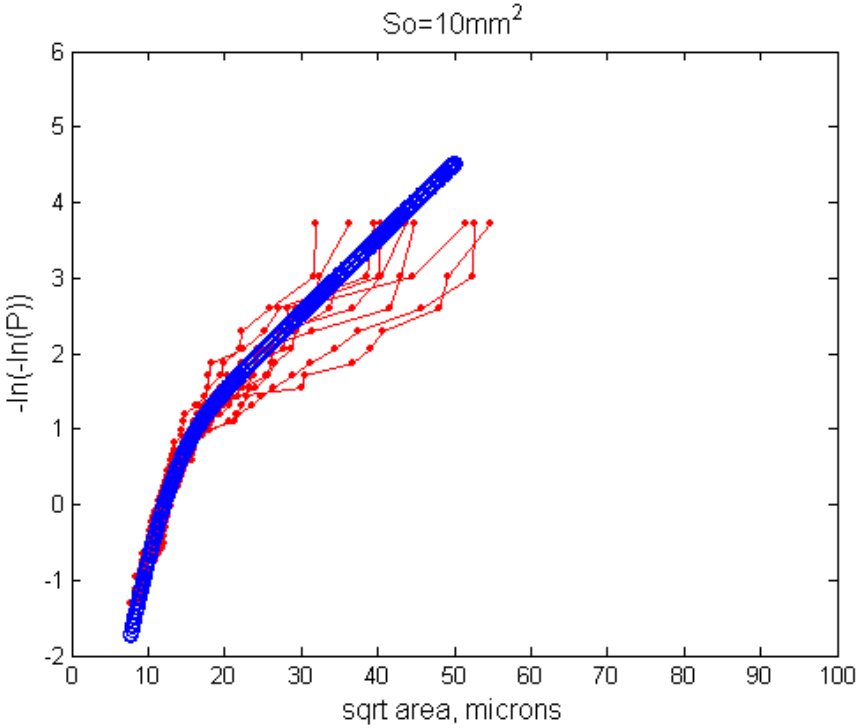
Block maxima



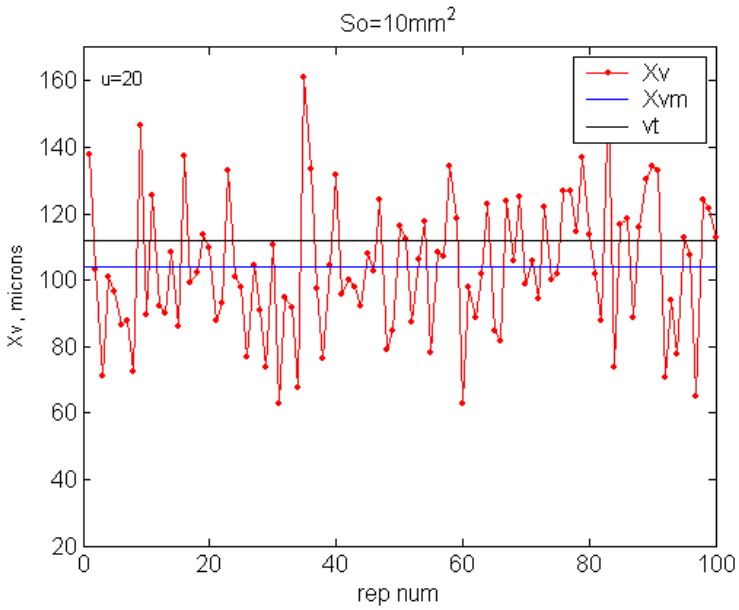


The ‘knee’ is not so evident !

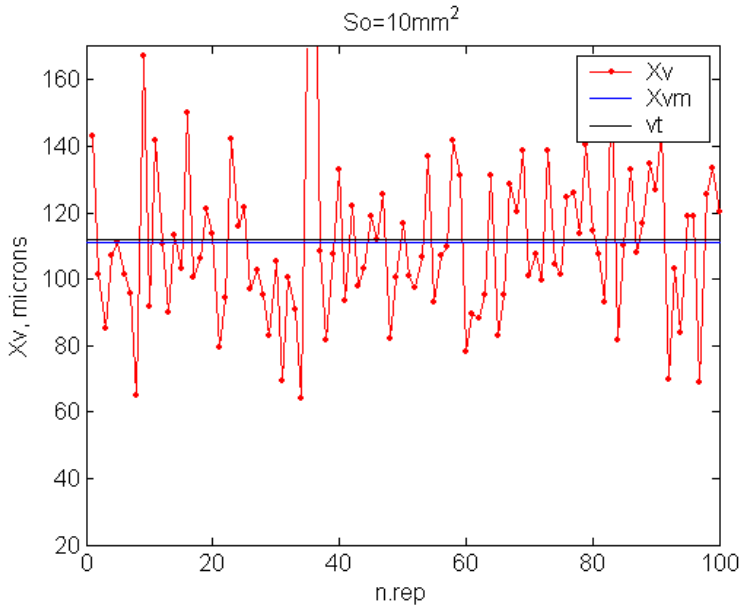
Can we precisely estimate the extreme particles ?

Comparison of estimates

‘Characteristic size of maximum inclusion’ in an area of 10000 mm^2



POT



Competing risks

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