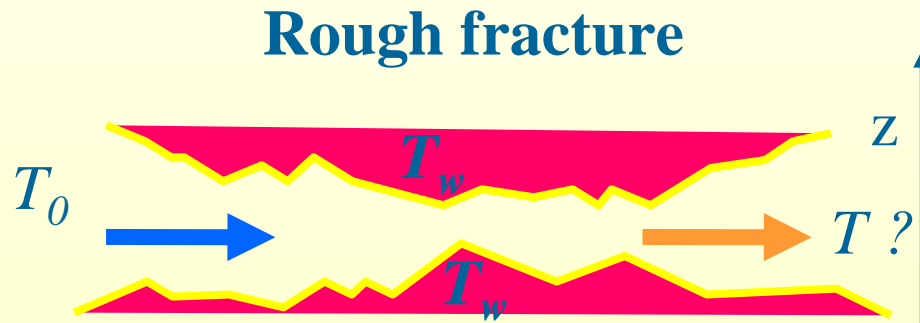


Hydro-thermal coupling in a rough fracture

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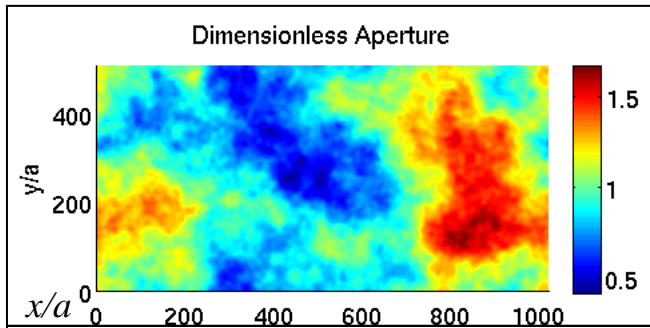


Impact of roughness on
the fluid thermalization ?

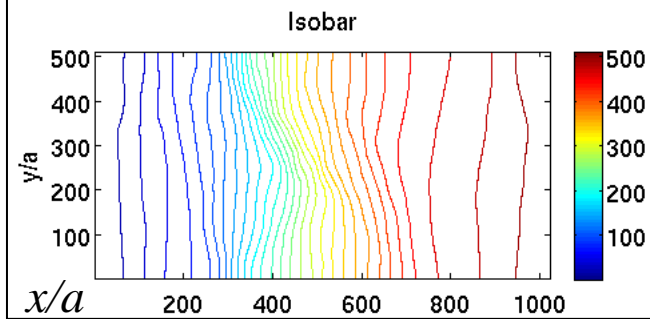
Modeling of :

- * Rough fractures
- * Hydraulic flows
- * Thermalization

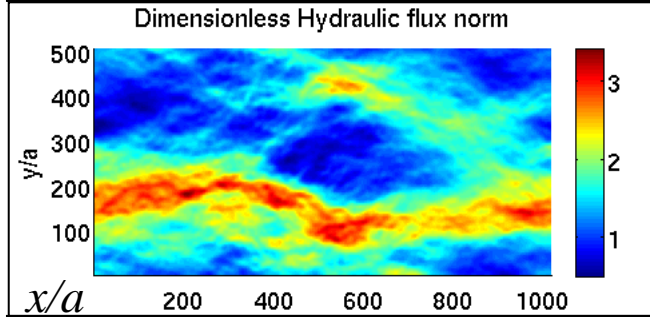
Numerical modeling



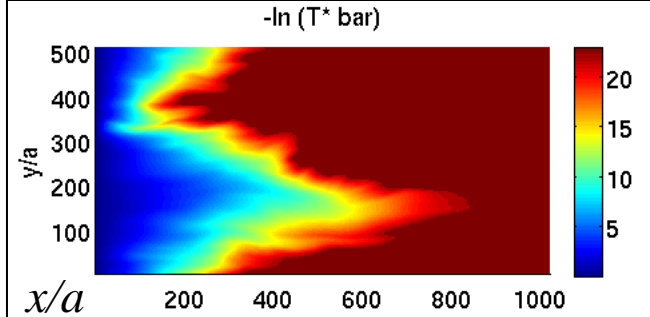
Rough apertures : Self affine model



Isobars : Stokes equation



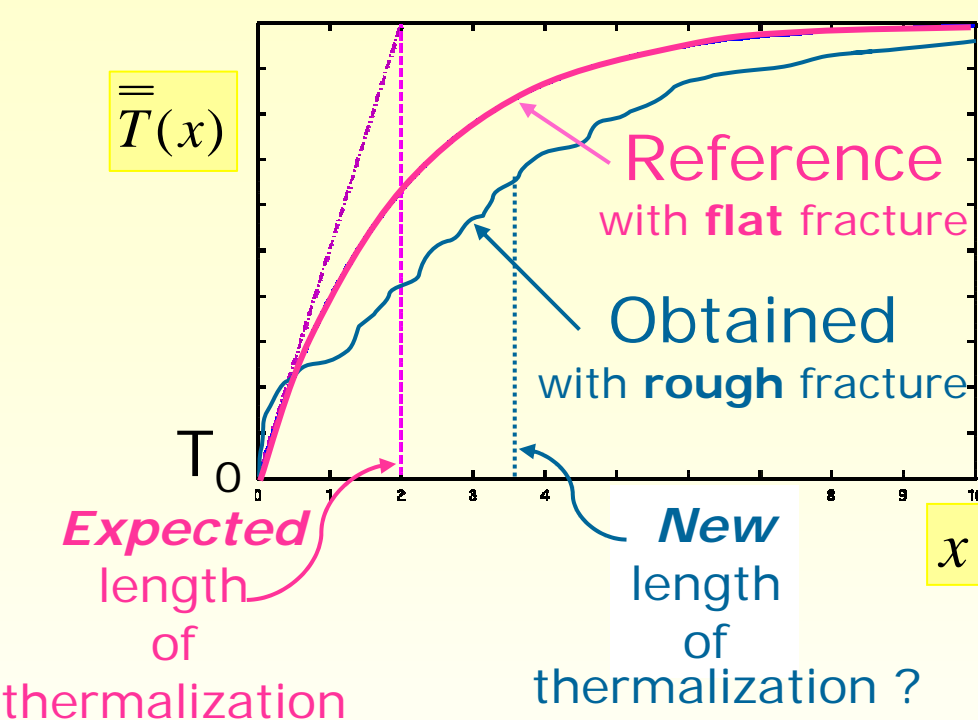
Hydraulic flux



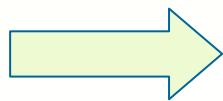
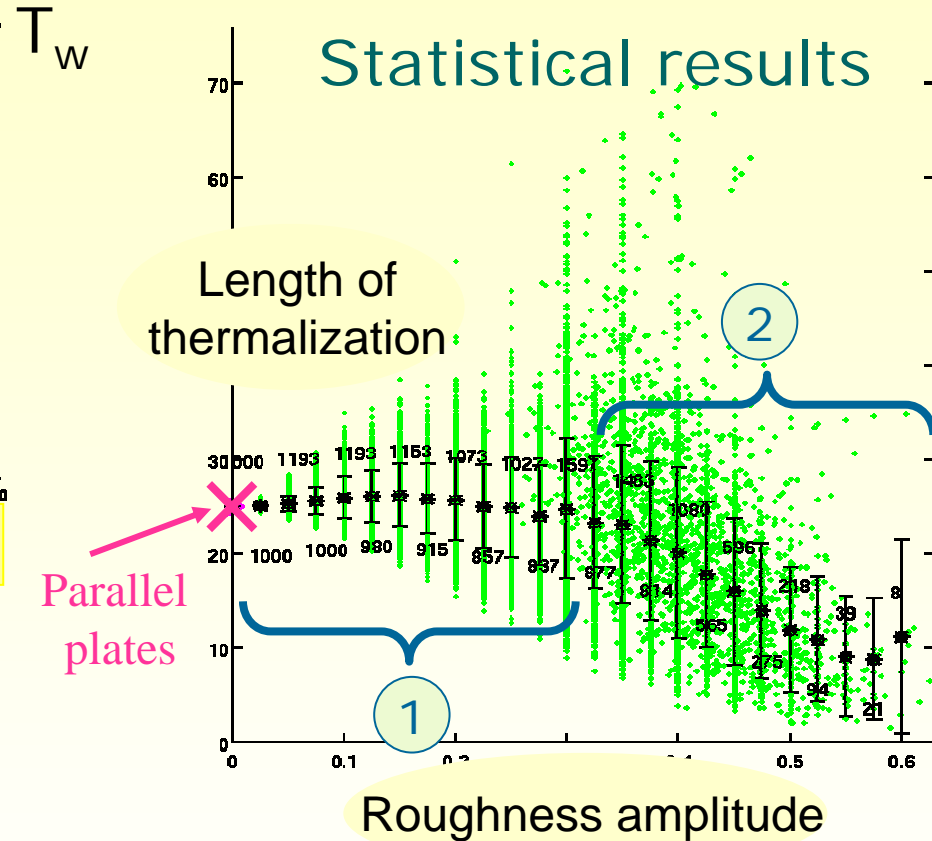
2D Temperatures : Energy balance

- Channeling
- New characteristic length of thermalization ?

Length of thermalization ?



$$\bar{T}_{ref} - T_w = (T_0 - T_w) \exp\left(-\frac{x}{l_{ref}}\right)$$



- High variability
- Trend
 - ① Thermalization slower
 - ② Thermalization enhanced