*material parameters in and out of channel:*
$\rho, \lambda, c_p$

*geometry: $d, \phi$*

$K \sim \dfrac{(1-\phi)}{d^2}$

$x=L$

$x=0$
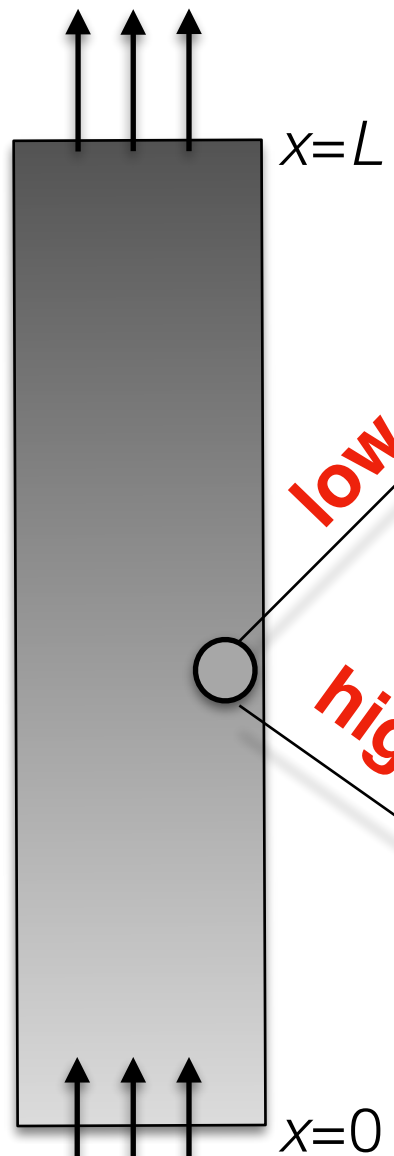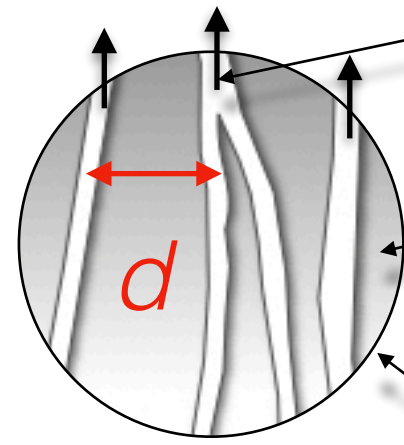
average velocity = $v_{channel}$

**high-porosity channels**

**low-porosity outside channels**

low K

high K

*same* channel volume fraction, $\phi$

$d$

$d$
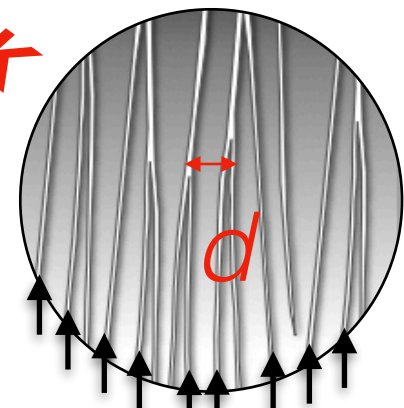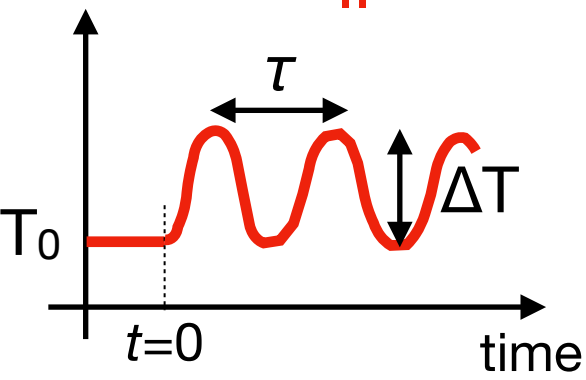
average velocity = $v_{channel}$

$T_{channel}(x=0)$

I

$T_0$    $\Delta T$

$t=0$    time

II

$\tau$

$T_0$    $\Delta T$

$t=0$    time

III

$T_0$    $\tau$    $\Delta T$

$t=0$    time