The diagram illustrates the flow through channels with varying porosity. The average velocity in the channel is given as $v_{\text{channel}}$. The material parameters in and out of the channel are $\rho$, $\lambda$, and $c_p$. The geometry consists of $d$, $\phi$. The permeability $K$ is related to the volume fraction $\phi$ by $K \sim \frac{(1-\phi)}{d^2}$. The temperature $T_{\text{channel}}(x=0)$ at the channel inlet shows a step change at $t=0$ and a sinusoidal variation with period $\tau$. The temperature $T_0$ is the initial temperature at $t=0$. The temperature increases by $\Delta T$ at $t=0$.