Mathematische Modelle:

- **Modell 1:** Instationäre Wärmeleitgl. in Integralbilanzform

(2) Ges. Temperaturfeld $T(x,t)$:

$$\int_{x_1}^{x_2} c\varrho\,(T(x,t_2)-T(x,t_1))\,dx - \int_{t_1}^{t_2}\left(\lambda \frac{\partial T}{\partial x}(x_2,t) - \lambda \frac{\partial T}{\partial x}(x_1,t)\right)dt + \int_{t_1}^{t_2}\int_{x_1}^{x_2} \bar{\alpha}\, T(x,t)\,dx\,dt = \int_{t_1}^{t_2}\int_{x_1}^{x_2} f(x,t)\,dx\,dt + \int_{t_1}^{t_2}\int_{x_1}^{x_2} \bar{\alpha}\, T_u(x,t)\,dx\,dt$$

$\forall \bar{x} \in (a,b)\ \forall \Delta x > 0 : [x_1,x_2] \subset (a,b),\ x_1 = \bar{x} - \frac{\Delta x}{2},\ x_2 = \bar{x} + \frac{\Delta x}{2}$

$\forall \bar{t} \in (0,t_E)\ \forall \Delta t > 0 : [t_1,t_2] \subset (0,t_E),\ t_1 = \bar{t} - \frac{\Delta t}{2},\ t_2 = \bar{t} + \frac{\Delta x}{2}$

$+ RB: \ T(a,t) = T_a(t),\ T(b,t) = T_b(t) \quad \forall t \in (0,t_E)$

$+ AB: \ T(x,0) = T_A(x) \quad \forall x \in [a,b]$

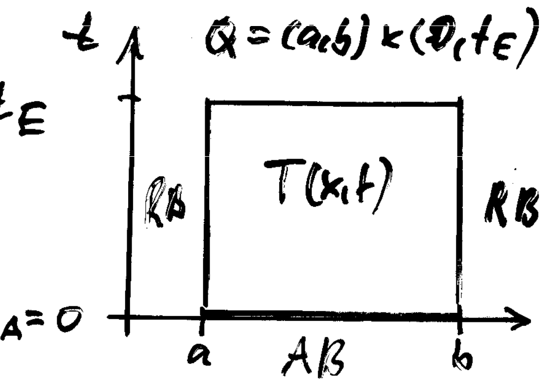
$\lim\limits_{\substack{\Delta x \to 0 \\ \Delta t \to 0}} \frac{1}{\Delta x \Delta t}\,(2)$ $\Downarrow$ (Vor.) $\qquad \Uparrow$ $\int_{t_1}^{t_2}\int_{x_1}^{x_2} (3)\,dx\,dt$

- **Modell 2:** Instat. Wärmeleitgl. in differentieller Form

(3) Ges. Temperaturfeld $T \in C^{2,1}(Q) \cap C(\bar{Q})$:

$$c\varrho \frac{\partial T}{\partial t}(x,t) - \frac{\partial}{\partial x}\left(\lambda \frac{\partial T}{\partial x}(x,t)\right) + \bar{\alpha}\, T(x,t) = f(x,t) + \bar{\alpha}\, T_u(x,t) \quad \forall (x,t) \in Q$$

$+ RB: \left.\begin{array}{l} T(a,t) = T_a(t) \\ T(b,t) = T_b(t) \end{array}\right\} t \in (0,t_E)$



$+ AB: \ T(x,0) = T_A(x) \quad \forall x \in [a,b]$

$C^{k,l}(\bar{Q})$

k mal stetig diffbar nach x

Raum-Zeit-Zylinder

l mal stetig diffbar nach t

Continuous

$C = C^{0,0} = C^0$