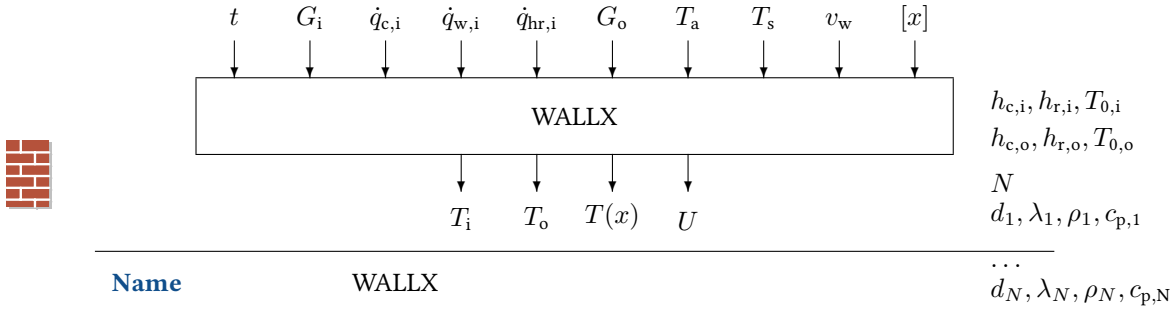
## Block WALLX

The WALLX block solves the one-dimensional heat transfer equation for an external wall consisting of several layers with varying thickness and heat conductivity. As boundary conditions, the exterior temperature and solar irradiance is given for the outside wall surface, on the inside shortwave irradiance, convective heat flux from the room air and longwave radiation flux from the other surfaces are given as boundary conditions.




| | |
|---|---|
| **Name** | WALLX |
| **Function** | bs0001 |
| **Inputs** | 9 . . . [10] |
| **Outputs** | 4 |
| **Parameters** | 11 . . . [47] |
| **Strings** | 0 |
| **Group** | 3 |

### Inputs

| | |
|---|---|
| 1 | Time / s |
| 2 | Interior solar radiation gains $G_\mathrm{i}$ / $\mathrm{W\,m^{-2}}$ |
| 3 | Interior convective heat flux from room air $\dot{q}_\mathrm{c,i}$ / $\mathrm{W\,m^{-2}}$ |
| 4 | Longwave heat flux from interior wall surfaces $\dot{q}_\mathrm{w,i}$ / $\mathrm{W\,m^{-2}}$ |
| 5 | Radiative part of internal heat sources $\dot{q}_\mathrm{hr,i}$ / $\mathrm{W\,m^{-2}}$ |
| 6 | Exterior solar radiation gains / $\mathrm{W\,m^{-2}}$ $G_\mathrm{o}$ / $\mathrm{W\,m^{-2}}$ |
| 7 | Ambient temperature / °C |
| 8 | Sky temperature / °C |
| 9 | Wind speed / $\mathrm{m\,s^{-1}}$ |
| 6 | Exterior solar radiation gains / $\mathrm{W\,m^{-2}}$ $G_\mathrm{o}$ / $\mathrm{W\,m^{-2}}$ |
| 7 | Exterior convective heat flux from ambient air $\dot{q}_\mathrm{c,o}$ / $\mathrm{W\,m^{-2}}$ |
| 8 | Exterior radiative heat flux from sky $\dot{q}_\mathrm{rs,o}$ / $\mathrm{W\,m^{-2}}$ |
| 9 | Exterior radiative heat flux from environment $\dot{q}_\mathrm{re,o}$ / $\mathrm{W\,m^{-2}}$ |
| 10 | Distance $x$ from inner surface / m |

## Outputs

| | |
|---|---|
| 1 | Interior surface temperature at $t + \Delta t$ |
| 2 | Exterior surface temperature at $t + \Delta t$ |
| 3 | Temperature at distance $x$ from inner surface |
| 4 | $U$-value / $\mathrm{W\,m^{-2}\,K^{-1}}$ |

## Parameters

| | |
|---|---|
| 1 | Interior convective heat transfer coefficient $h_{\mathrm{c,i}}$ / $\mathrm{W\,m^{-2}\,K^{-1}}$ |
| 2 | Interior radiative heat transfer coefficient $h_{\mathrm{r,i}}$ / $\mathrm{W\,m^{-2}\,K^{-1}}$ |
| 3 | Initial value interior air temperature $T_{0,\mathrm{i}}$ / °C |
| 4 | Exterior convective heat transfer coefficient $h_{\mathrm{c,o}}$ / $\mathrm{W\,m^{-2}\,K^{-1}}$ |
| 5 | Exterior radiative heat transfer coefficient $h_{\mathrm{r,o}}$ / $\mathrm{W\,m^{-2}\,K^{-1}}$ |
| 6 | Initial value exterior air temperature $T_{0,\mathrm{o}}$ / °C |
| 7 | Number of different material layers of wall $1 \leq N_{\mathrm{l}} \leq 10$ |
| 8 | Thickness of material layer one / m |
| 9 | Heat conductivity of layer one / $\mathrm{W\,m^{-1}\,K^{-1}}$ |
| 10 | Density of material layer one / $\mathrm{kg\,m^{-3}}$ |
| 11 | Heat capacity of material layer one / $\mathrm{J\,kg^{-1}\,K^{-1}}$ |
| 12 | Thickness of further material layer |
| 13 | Heat conductivity of further layer |
| 14 | Density of further material layer |
| 15 | Heat capacity of further material layer |
| ... | etc. |

## Strings

None