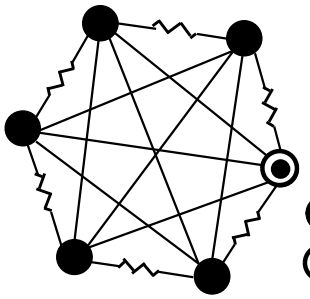
Balance equations for nodal systems of heat and gas transfer and coefficients for system identification : $c_{i,j}$, $m_{i,j}$ and $r_{i,j}$

The state x_i represents temperature of node i in heat transfer system ,
similar x_i represents gas concentration of node i in gas transfer system.

$$\sum_{j=1}^{n} m_{i,j} \cdot \dot{x}_j = \sum_{j=1}^{n+no} c_{i,j} \cdot (x_j - x_i) + \sum_{j=1}^{ng} r_{i,j} \cdot g_j \quad (1)$$



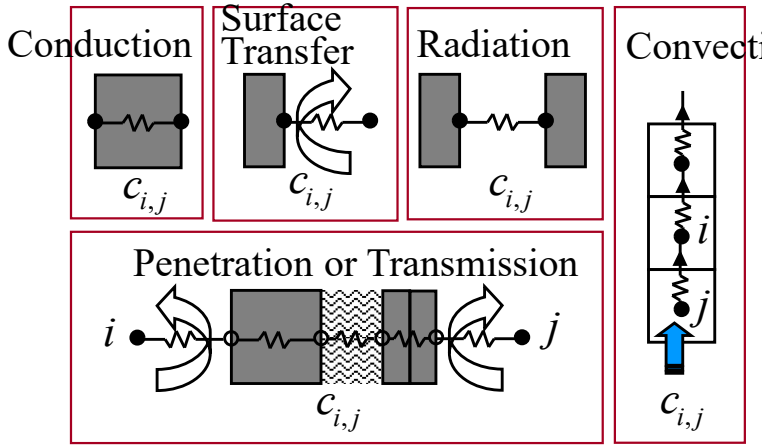
Unknown state
Total node: n

Given state
Total node: no

- with Capacity
- Capacity zero
- Given state node

g_j is heat or gas generation rate of source j.
ng is total number of generation sources.

$c_{i,j}$ Heat:Generalized thermal conductance
Gas:Air flow rate, from node j to i



$m_{i,j}$:Heat:Equivalent heat capacity,
:Gas :Effective mixing volume of node i associated with node j

$r_{i,j}$:Heat:Solar heat gain coefficient,
Heat and Electricity conversion etc.
:Gas :Unit conversion
Distribution coefficient etc.
from source j to node i