# NOTES

1) Should BldT3(air) be changing between 1 and 2 modules?

* Dependent variables on temperature will change values as system grows.
  - ex: • Cp_a - balances between $\frac{T[j+1]+T[j+2]}{2}$
    • R('pipe') - uses max temp of air
* When updating values for 2 modules results matched
* Better question: Physically should these values change?
  - Length increases effecting convection heat transfer (L → Re → Nu → h ↑A → R → Q)
    - Overall convection heat transfer will increase but should it for the specific region?
    - Equation:

      m_a * Cp('a', [T[j+2] + T[j+1])/2.0

      + 1/2/R('pipe') + 1/2/R('int') + 1/2/R('ext')

      Note: Conduction parts are uneffected only convection parts

$h = \frac{k}{l} * Nu$ $T = (T[0] + T[m*4])/2.0$

or $(T[1] + T[m*4+1])/2.0$

$L = tubing\_length * m$

$Re = \frac{V\_a * L}{viscosity\_a(T)}$

$Nu = 0.0296 * Re ** (4.0/5) * Pr\_a(T)^{1/3}$

$h = k/L * Nu$

$L = 1$ (Full system)

$L = 1/2$ (Half of system)

Assuming $Nu = 1$ (for thought experiment)

$h = \frac{k}{1} \times 1 = k$

$h = \frac{k}{1/2} \times Nu = 1/2k$

Overall convection heat transfer of system will grow due to longer length, higher Re, and more mixing.