EXAMPLE 8.1-2: Conductance of a Cross-Flow Heat Exchanger (revisited)

a.) Calculate the total conductance for the crossflow heat exchanger described in EXAMPLE 8.1-1 using the compact heat exchanger library in EES. Also, estimate the air-side pressure drop across this heat exchanger.

The EES code for this example is appended to the code from EXAMPLE 8.1-1. The heat exchanger geometry provided in EXAMPLE 8.1-1 is consistent with the finned circular tube surface 8.0-3/8T which has the identifier 'fc-tubes_s80-38T'. The heat transfer coefficient predicted by the compact heat exchanger library is obtained using the CHX_h_finned_tube procedure:

```
"Compact heat exchanger correlation"
TypeHX$='fc_tubes_s80-38T'                                    "heat exchanger identifier name"
Call CHX_h_finned_tube(TypeHX$, V_dot_C*rho_air, W*H, 'Air',T_avg, P:h_bar_out_CHX)
                                                              "access compact heat exchanger procedure"
```

which leads to $\bar{h}_{out,CHX}$ = 43.7 W/m^2-K. This estimate of the heat transfer coefficient compares favorably to the two estimates obtained in EXAMPLE 8.1-1, $\bar{h}_{out,ext}$ = 47. W/m^2-K and $\bar{h}_{out,int}$ = 39.0 W/m^2-K. The heat transfer coefficient is used to predict the total conductance (note that the calculation of the water-side resistance, fouling resistance, etc., remains as discussed in EXAMPLE 1.8-1).

```
h_bar_out=h_bar_out_CHX                                  "set the air-side heat transfer coefficient"
```

which leads to UA = 58.4 W/m^2-K.

The pressure drop for this finned circular tube crossflow heat exchanger can be estimated using the procedure CHX_DELTAp_finned_tube, which obtains the friction factor and uses Eq. (8-14) to calculate the associated pressure drop:

```
Call CHX_DELTAp_finned_tube(TypeHX$, V_dot_C*rho_air, W*H,L, 'Air', T_avg, T_avg, P: DELTAp)
                              "access compact heat exchanger procedure"
```

which leads to Δp = 6.0 Pa.