$$Q_s = \rho_a c_p C_D^* (1 + \alpha_s T_o') \|\mathbf{U}\| (T_o - T_a) \tag{1}$$
$$Q_L = \rho_a L_v C_D^* (1 + \alpha_L T_o') \|\mathbf{U}\| (q_o^* - q_a) \tag{2}$$

and the total flux is

$$F = Q_s + Q_L \tag{3}$$

sensible

$$
\begin{aligned}
Q_s =& C_D^s (1 + \alpha_s T_o')(U + U')(T_o + T_o' - T_a - T_a') \\
Q_s \propto& C_D^s U (T_o - T_a) + C_D^s (T_o' - T_a') U - C_D^s T_a U' - C_D^s T_a' U' + C_D^s T_o U' + ... \\
& C_D^s T_o' U' + C_D^s T_o'^2 U \alpha_s + C_D^s T_o'^2 U' \alpha_s - C_D^s T_a T_o' U \alpha_s - C_D^s T_a' T_o' U \alpha_s + ... \\
& C_D^s T_o T_o' U \alpha_s - C_D^s T_a T_o' U' \alpha_s - C_D^s T_a' T_o' U' \alpha_s + C_D^s T_o T_o' U' \alpha_s \\
Q_s \propto& C_D^s T_o - U - C_D^s T_a' U - C_D^s T_a U + C_D^s T_o' U - C_D^s T_a U' - C_D^s T_a' U' + C_D^s T_o U' + ... \\
& C_D^s T_o' U' + C_D^s T_o'^2 U \alpha_s + C_D^s T_o'^2 U' \alpha_s - C_D^s T_a T_o' U \alpha_s - C_D^s T_a' T_o' U \alpha_s + ... \\
& C_D^s T_o T_o' U \alpha_s - C_D^s T_a T_o' U' \alpha_s - C_D^s T_a' T_o' U' \alpha_s + C_D^s T_o T_o' U' \alpha_s
\end{aligned}
$$