Solving for the flows and the intermediary pressures

Clearing everything

clc; clear; close all;

Defining the symbols. Note that P1, Q

syms Q\_1 Q\_2 Q\_3 Q\_4 Q\_5 k\_A k\_B k\_C k\_D k P\_des P\_1 P\_3 P\_4 alpha\_1 alpha\_2

Setting up the simultaneous equations

eqn(1) = Q\_1 == k\_A\*sqrt(P\_des-P\_3);

eqn(2) = Q\_2 == k\_B\*sqrt(P\_3-P\_1);

eqn(3) = Q\_2 == Q\_1 - Q\_3;

eqn(4) = Q\_4 == k\_C\*sqrt(P\_4-P\_1);

eqn(5) = Q\_5 == k\_D\*sqrt(P\_des-P\_4);

eqn(6) = Q\_4 == Q\_3 + Q\_5;

Solving the simultaneous equations

S = solve(eqn, [Q\_1, Q\_2, Q\_4, Q\_5, P\_3, P\_4]);

disp(S.Q\_1)

disp(S.Q\_2)

disp(S.Q\_4)

disp(S.Q\_5)

disp(S.P\_3)

disp(S.P\_4)