BCC Model Transfer Function Expressions

Model №1: expression of the transfer function

Kp=-zn*(-C2*C1*p^4*L3*C3*L4*C4-
C2*C1*p^3*L3*C3*R4*C4-C2*C1*p^2*L3*C3-
C2*C1*R3*p^3*C3*L4*C4-C2*C1*R3*p^2*C3*R4*C4-
C2*C1*R3*p*C3-C2*C1*p^2*L4*C4-C2*C1*R4*p*C4-
C2*C1+C3*C4*p^4*L2*C2*L1*C1+C3*C4*p^3*L2*C2*R1*C1+C
3*C4*p^2*L2*C2+C3*C4*R2*p^3*C2*L1*C1+C3*C4*R2*p^2*C
2*R1*C1+C3*C4*R2*p*C2+C3*C4*p^2*L1*C1+C3*C4*R1*p*C1
+C3*C4)*Rd3*p/((C2*p^4*L3*C3*L4*C4+C2*p^3*L3*C3*R4*
C4+C2*R3*p^3*C3*L4*C4+C2*R3*p^2*C3*R4*C4+C4*R3*p*C3
+C4*R2*p*C2+C4*p^2*L1*C1+C4*p^2*L3*C3+C4*p^2*L2*C2+
C4*R1*p*C1+C3*p^2*L4*C4+C3*R2*p*C2+C3*p^2*L1*C1+C3*
R4*p*C4+C3*p^2*L2*C2+C3*R1*p*C1+C2*p^2*L1*C1+C2*R1*
p*C1+C1*R3*p*C3+C1*p^2*L4*C4+C1*R2*p*C2+C1*p^2*L3*C
3+C1*R4*p*C4+C1*p^2*L2*C2+C1+C2+C3+C2*p^2*L3*C3+C2*
p^2*L4*C4+C2*R3*p*C3+C2*R4*p*C4+C4+zn*p*C1*C4+zn*p^
3*C1*C4*L3*C3+zn*p^2*C1*C4*R3*C3+zn*p^3*C1*C4*L2*C2
+zn*p^2*C1*C4*R2*C2+zn*p*C3*C2+zn*p^3*C3*C2*L1*C1+z
n*p^2*C3*C2*R1*C1+zn*p^3*C3*C2*L4*C4+zn*p^2*C3*C2*R
4*C4+zn*p*C3*C4+zn*p^3*C3*C4*L2*C2+zn*p^2*C3*C4*R2*
C2+zn*p^3*C3*C4*L1*C1+zn*p^2*C3*C4*R1*C1+zn*p*C2*C1
+zn*p^3*C2*C1*L3*C3+zn*p^2*C2*C1*R3*C3+zn*p^3*C2*C1
*L4*C4+zn*p^2*C2*C1*R4*C4+C4*p^4*L2*C2*L1*C1+C4*p^3
*L2*C2*R1*C1+C4*R2*p^3*C2*L1*C1+C4*R2*p^2*C2*R1*C1+
C4*p^4*L3*C3*L2*C2+C4*p^3*L3*C3*R2*C2+C4*R3*p^3*C3*
L2*C2+C4*R3*p^2*C3*R2*C2+C4*p^4*L1*C1*L3*C3+C4*p^3*
L1*C1*R3*C3+C4*R1*p^3*C1*L3*C3+C4*R1*p^2*C1*R3*C3+C
3*p^4*L2*C2*L1*C1+C3*p^3*L2*C2*R1*C1+C3*R2*p^3*C2*L
1*C1+C3*R2*p^2*C2*R1*C1+C3*p^4*L1*C1*L4*C4+C3*p^3*L
1*C1*R4*C4+C3*R1*p^3*C1*L4*C4+C3*R1*p^2*C1*R4*C4+C3
*p^4*L2*C2*L4*C4+C3*p^3*L2*C2*R4*C4+C3*R2*p^3*C2*L4
*C4+C3*R2*p^2*C2*R4*C4+C2*p^4*L1*C1*L4*C4+C2*p^3*L1
*C1*R4*C4+C2*R1*p^3*C1*L4*C4+C2*R1*p^2*C1*R4*C4+C2*
p^4*L1*C1*L3*C3+C2*p^3*L1*C1*R3*C3+C2*R1*p^3*C1*L3*
C3+C2*R1*p^2*C1*R3*C3+C1*p^4*L3*C3*L4*C4+C1*p^3*L3*

C3*R4*C4+C1*R3*p^3*C3*L4*C4+C1*R3*p^2*C3*R4*C4+C1*p
^4*L3*C3*L2*C2+C1*p^3*L3*C3*R2*C2+C1*R3*p^3*C3*L2*C
2+C1*R3*p^2*C3*R2*C2+C1*p^4*L2*C2*L4*C4+C1*p^3*L2*C
2*R4*C4+C1*R2*p^3*C2*L4*C4+C1*R2*p^2*C2*R4*C4+zn*p^
5*C1*C4*L3*C3*L2*C2+zn*p^4*C1*C4*L3*C3*R2*C2+zn*p^4
*C1*C4*R3*C3*L2*C2+zn*p^3*C1*C4*R3*C3*R2*C2+zn*p^5*
C3*C2*L1*C1*L4*C4+zn*p^4*C3*C2*L1*C1*R4*C4+zn*p^4*C
3*C2*R1*C1*L4*C4+zn*p^3*C3*C2*R1*C1*R4*C4+zn*p^5*C3
*C4*L2*C2*L1*C1+zn*p^4*C3*C4*L2*C2*R1*C1+zn*p^4*C3*
C4*R2*C2*L1*C1+zn*p^3*C3*C4*R2*C2*R1*C1+zn*p^5*C2*C
1*L3*C3*L4*C4+zn*p^4*C2*C1*L3*C3*R4*C4+zn*p^4*C2*C1
*R3*C3*L4*C4+zn*p^3*C2*C1*R3*C3*R4*C4+C4*p^6*L2*C2*
L1*C1*L3*C3+C4*p^5*L2*C2*L1*C1*R3*C3+C4*p^5*L2*C2*R
1*C1*L3*C3+C4*p^4*L2*C2*R1*C1*R3*C3+C4*R2*p^5*C2*L1
*C1*L3*C3+C4*R2*p^4*C2*L1*C1*R3*C3+C4*R2*p^4*C2*R1*
C1*L3*C3+C4*R2*p^3*C2*R1*C1*R3*C3+C3*p^6*L2*C2*L1*C
1*L4*C4+C3*p^5*L2*C2*L1*C1*R4*C4+C3*p^5*L2*C2*R1*C1
*L4*C4+C3*p^4*L2*C2*R1*C1*R4*C4+C3*R2*p^5*C2*L1*C1*
L4*C4+C3*R2*p^4*C2*L1*C1*R4*C4+C3*R2*p^4*C2*R1*C1*L
4*C4+C3*R2*p^3*C2*R1*C1*R4*C4+C2*p^6*L1*C1*L3*C3*L4
*C4+C2*p^5*L1*C1*L3*C3*R4*C4+C2*R1*p^5*C1*L3*C3*L4*
C4+C2*R1*p^4*C1*L3*C3*R4*C4+C2*p^5*L1*C1*R3*C3*L4*C
4+C2*p^4*L1*C1*R3*C3*R4*C4+C2*R1*p^4*C1*R3*C3*L4*C4
+C2*R1*p^3*C1*R3*C3*R4*C4+C1*p^6*L3*C3*L2*C2*L4*C4+
C1*p^5*L3*C3*L2*C2*R4*C4+C1*p^5*L3*C3*R2*C2*L4*C4+C
1*p^4*L3*C3*R2*C2*R4*C4+C1*R3*p^5*C3*L2*C2*L4*C4+C1
*R3*p^4*C3*L2*C2*R4*C4+C1*R3*p^4*C3*R2*C2*L4*C4+C1*
R3*p^3*C3*R2*C2*R4*C4)*(Rd1+Rd2+Rd3));

where p=jw

Model №2: expression of the transfer function

Kp=p*(R1*p*C1*C2+p^2*L1*C1*C2+C2+R2*p*C1*C2+p^2*L2*
C1*C2+C1)*(R3*p*C3*C4+p^2*L3*C3*C4+C4+R4*p*C3*C4+p^
2*L4*C3*C4+C3)*zn*Rd3/((R3*p^5*C3*L4*C4*L2*C1*C2+p^
4*L3*C3*L2*C1*C2+R3*p^3*C3*R4*C4*R1*C1*C2+R1*p^3*C1
*R2*C2*R3*C3*C4+R1*p^4*C1*R2*C2*L3*C3*C4+R1*p^3*C1*
R2*C2*R4*C3*C4+R1*p^4*C1*R2*C2*L4*C3*C4+R1*p^4*C1*L

$$2*C2*R3*C3*C4+p^5*L3*C3*L4*C4*R2*C1*C2+R3*p*C3*C1+p$$
$$^2*L3*C3*C2+p^2*L3*C3*C1+R4*p*C4*C2+R4*p*C4*C1+p^2*$$
$$L4*C4*C2+p^2*L4*C4*C1+R1*p^5*C1*L2*C2*L3*C3*C4+R1*p$$
$$^4*C1*L2*C2*R4*C3*C4+p^4*L4*C4*L1*C1*C2+p^4*L1*C1*R$$
$$2*C2*R4*C3*C4+p^5*L1*C1*R2*C2*L4*C3*C4+p^5*L1*C1*R2$$
$$*C2*L3*C3*C4+R1*p^5*C1*L2*C2*L4*C3*C4+p^4*L1*C1*R2*$$
$$C2*R3*C3*C4+p^5*L1*C1*L2*C2*R4*C3*C4+p^5*L1*C1*L2*C$$
$$2*R3*C3*C4+p^6*L1*C1*L2*C2*L3*C3*C4+C1+zn*p^3*C2*L3$$
$$*C3*C4+p^6*L3*C3*L4*C4*L1*C1*C2+zn*p^4*R1*C1*C2*L3*$$
$$C3*C4+zn*p^3*R1*C1*C2*R4*C3*C4+p^6*L1*C1*L2*C2*L4*C$$
$$3*C4+zn*p^3*R1*C1*C2*R3*C3*C4+zn*p^5*L1*C1*C2*L3*C3$$
$$*C4+zn*p^4*L1*C1*C2*R4*C3*C4+zn*p^4*R1*C1*C2*L4*C3*$$
$$C4+zn*p^4*L1*C1*C2*R3*C3*C4+C3+C4+zn*p^5*L1*C1*C2*L$$
$$4*C3*C4+zn*p^3*R2*C1*C2*R3*C3*C4+C2+zn*p^4*R2*C1*C2$$
$$*L3*C3*C4+zn*p^3*R2*C1*C2*R4*C3*C4+zn*p^5*L2*C1*C2*$$
$$L4*C3*C4+zn*p^5*L2*C1*C2*L3*C3*C4+zn*p^4*L2*C1*C2*R$$
$$4*C3*C4+zn*p^4*R2*C1*C2*L4*C3*C4+zn*p^4*L2*C1*C2*R3$$
$$*C3*C4+R2*p*C2*C4+R2*p*C2*C3+p^2*L2*C2*C4+p^2*L1*C1$$
$$*C2+p^5*L3*C3*R4*C4*L2*C1*C2+zn*p^2*C2*R3*C3*C4+R1*$$
$$p*C1*C3+p^2*L1*C1*C4+p^2*L1*C1*C3+p^3*L4*C4*R1*C1*C$$
$$2+R4*p^3*C4*L2*C1*C2+R4*p^2*C4*R2*C1*C2+R4*p^3*C4*L$$
$$1*C1*C2+R2*p^2*C2*R4*C3*C4+R2*p^3*C2*L4*C3*C4+p^3*L$$
$$2*C2*R3*C3*C4+p^4*L2*C2*L3*C3*C4+p^3*L2*C2*R4*C3*C4$$
$$+p^4*L2*C2*L4*C3*C4+zn*p^2*R1*C1*C2*C4+zn*p^2*R1*C1$$
$$*C2*C3+zn*p^3*L1*C1*C2*C4+zn*p^3*L1*C1*C2*C3+zn*p^2$$
$$*C2*R4*C3*C4+zn*p^3*C2*L4*C3*C4+zn*p^2*R2*C1*C2*C4+$$
$$zn*p^2*R2*C1*C2*C3+zn*p^3*L2*C1*C2*C4+zn*p^3*L2*C1*$$
$$C2*C3+zn*p^2*C1*R3*C3*C4+zn*p^3*C1*L3*C3*C4+zn*p^2*$$
$$C1*R4*C3*C4+zn*p^3*C1*L4*C3*C4+R3*p^2*C3*R4*C4*C2+R$$
$$3*p^2*C3*R4*C4*C1+R3*p^3*C3*L4*C4*C2+R3*p^3*C3*L4*C$$
$$4*C1+R3*p^2*C3*R1*C1*C2+R3*p^3*C3*L1*C1*C2+R3*p^2*C$$
$$3*R2*C1*C2+R3*p^3*C3*L2*C1*C2+p^3*L3*C3*R4*C4*C2+p^$$
$$3*L3*C3*R4*C4*C1+p^4*L3*C3*L4*C4*C2+p^4*L3*C3*L4*C4$$
$$*C1+p^3*L3*C3*R1*C1*C2+p^4*L3*C3*L1*C1*C2+p^3*L3*C3$$
$$*R2*C1*C2+R4*p^2*C4*R1*C1*C2+R1*p^3*C1*L3*C3*C4+R1*$$
$$p^2*C1*R4*C3*C4+R1*p^3*C1*L4*C3*C4+p^3*L1*C1*R2*C2*$$
$$C4+p^3*L1*C1*R2*C2*C3+p^4*L1*C1*L2*C2*C4+p^4*L1*C1*$$
$$L2*C2*C3+p^3*L1*C1*R3*C3*C4+p^4*L1*C1*L3*C3*C4+p^3*$$
$$L1*C1*R4*C3*C4+p^4*L1*C1*L4*C3*C4+R2*p^2*C2*R3*C3*C$$
$$4+R2*p^3*C2*L3*C3*C4+R1*p^2*C1*R2*C2*C4+p^3*L4*C4*R$$

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2*C1*C2+zn*p*C1*C4+zn*p*C1*C3+R3*p*C3*C2+R3*p^4*C3*
L4*C4*R2*C1*C2+p^4*L3*C3*R4*C4*R1*C1*C2+p^4*L4*C4*L
2*C1*C2+R3*p^4*C3*R4*C4*L1*C1*C2+p^2*L4*C3*C4+p^2*L
3*C3*C4+R2*p*C1*C2+R1*p*C1*C2+p^2*L2*C1*C2+R3*p^5*C
3*L4*C4*L1*C1*C2+R3*p^4*C3*R4*C4*L2*C1*C2+p^5*L3*C3
*R4*C4*L1*C1*C2+p^4*L3*C3*R4*C4*R2*C1*C2+R3*p^3*C3*
R4*C4*R2*C1*C2+p^5*L3*C3*L4*C4*R1*C1*C2+R3*p^4*C3*L
4*C4*R1*C1*C2+R3*p*C3*C4+R4*p*C3*C4+R1*p*C1*C4+p^2*
L2*C2*C3+zn*p*C2*C4+zn*p*C2*C3+p^6*L3*C3*L4*C4*L2*C
1*C2+R1*p^2*C1*R3*C3*C4+R1*p^3*C1*L2*C2*C3+R1*p^3*C
1*L2*C2*C4+R1*p^2*C1*R2*C2*C3)*(Rd1+Rd2+Rd3));

where p=jw
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