Appendix 2.4

Table 2.10 : Summary of all Inductive Peaking Circuits

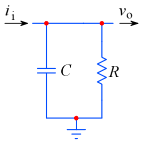
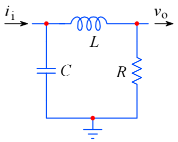
Single RC (non-peaking)	values	pole	frequency- & step-response
Reference For All Circuits 	$T = RC$ $\omega_h = 1/T$	$\sigma_{1p} = -\omega_h$	$\lvert F(\omega)\rvert = \frac{1}{\sqrt{1+(\omega/\omega_h)^2}}$ $\eta_b = 1$ $f(t) = 1 - e^{-t/T}$ $\tau_r = 2.2\,RC$ $\eta_r = 1$ $\delta = 0$
2-pole Series Peaking	MFA values	poles	frequency-response
	$\omega_h = 1/RC$ $L = 0.5\,R^2C$	$\sigma_{1p} = -\omega_h$ $\omega_{1p} = \pm\omega_h$	$\lvert F(\omega)\rvert = \frac{1}{\sqrt{1+0.25\,(\omega/\omega_H)4}}$ $\eta_b = 1.41$
	MFED values	poles	step-response
	$T = RC$ $L = 0.33\,R^2C$	$\sigma_{1p} = -1.5/T$ $\omega_{1p} = \pm 0.866/T$	$f(t) = 1 + 2\,e^{-1.5\,t/T}\sin(0.866\,t/T + 0.524 + \pi)$ $\eta_r = 1.36$ $\delta = 0.43\,\%$

Table 2.10.1 : Summary of all Inductive Peaking Circuits (continued)

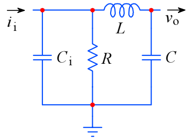
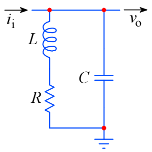
3-pole Series Peaking	MFA values	poles	frequency-response
	$\omega_h = 1/R(C + C_i)$ $L = \frac{2}{3} R^2 (C + C_i)$ $C_i = 0.25(C + C_i)$	$\sigma_{1p} = -\,\omega_h$ $\omega_{1p} = \pm\,1.732\,\omega_h$ $\sigma_{2p} = -\,2\,\omega_h$	$\lvert F(\omega)\rvert = \dfrac{1}{\sqrt{1 + 0.0156\,(\omega/\omega_h)^6}}$ $\eta_b = 2$
	MFED values	poles	step-response
	$T = R(C + C_i)$ $L = 0.48\,R^2 C$ $C_i = 0.17(C + C_i)$	$\sigma_{1p} = -\,1.839/T$ $\omega_{1p} = \pm\,1.754/T$ $\sigma_{3p} = -\,2.322/T$	$f(t) = 1 + 1.849\,\mathrm{e}^{-1.839\,t/T}\sin(1.754\,t/T + 2.597 + \pi)$ $-\,1.951\,\mathrm{e}^{-2.322\,t/T}$ $\eta_r = 1.82$ $\delta = 0.75\,\%$
2-pole Shunt Peaking	MFA values	poles & zeros	frequency-response
	$\omega_h = 1/RC$ $L = 0.414\,R^2 C$	$\sigma_{1p} = -\,1.208\,\omega_h$ $\omega_{1p} = \pm\,0.978\,\omega_h$ $\sigma_z = -\,2.416\,\omega_h$	$\lvert F(\omega)\rvert = \sqrt{\dfrac{1 + 0.172\,(\omega/\omega_h)}{1 - 0.172\,(\omega/\omega_h) + (\omega/\omega_h)^2}}$ $\eta_b = 1.72$
	MFED values	poles & zeros	step-response
	$T = RC$ $L = 0.32\,R^2 C$	$\sigma_{1p} = -\,1.5518/T$ $\omega_{1p} = \pm\,0.5374/T$ $\sigma_z = -\,3.1037/T$	$f(t) = 1 + 1.617\,\mathrm{e}^{-1.5518\,t/T}\sin(0.5374\,t/T + 0.6668 + \pi)$ $\eta_r = 1.60$ $\delta = 0.80\,\%$

Table 2.10.1 : Summary of all Inductive Peaking Circuits (continued)

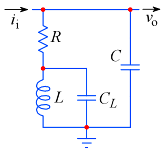
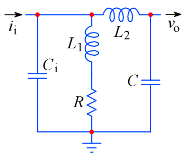
3-pole Shunt Peaking	MFA values	poles & zeros	frequency-respomse
	$\omega_h = 1/RC$ $L = 0.414\,R^2C$ $C_L = 0.35\,C$	$\sigma_{1p} = -0.850\,\omega_h$ $\omega_{1p} = \pm 1.577\,\omega_h$ $\sigma_{3p} = -2.125\,\omega_h$ $\sigma_z = -1.412\,\omega_h$ $\omega_z = \pm 2.197\,\omega_h$	$\lvert F(\omega)\rvert = \sqrt{\dfrac{\left[1-0.146\,(\omega/\omega_h)^2\right]^2 + 0.171\,(\omega/\omega_h)^2}{\left[1-0.560\,(\omega/\omega_h)^2\right]^2 + \left[1-0.146\,(\omega/\omega_h)^2\right]^2(\omega/\omega_h)^2}}$ $\eta_b = 1.84$
	MFED values	poles & zeros	step-response
	$T = RC$ $L = 0.33\,R^2C$ $C_L = 0.20\,C$	$\sigma_{1p} = -1.839/T$ $\omega_{1p} = \pm 1.754/T$ $\sigma_{3p} = -2.322/T$ $\sigma_z = -2.500/T$ $\omega_z = \pm 2.958/T$	$f(t) = 1 + 0.8054\,\mathrm{e}^{-1.604\,t/T}\sin(1.839\,t/T - 0.1772 + \pi)$ $-\,1.142\,\mathrm{e}^{-2.322\,t/T}$ $\eta_r = 1.73$ $\delta = 0.37\,\%$
4-pole Shunt-Series Pkg.	MFA values	poles & zeros	frequency-response
	$\omega_h = 1/R(C + C_i)$ $L_1 = 0.146\,R^2(C + C_i)$ $L_2 = 0.604\,R^2(C + C_i)$ $C_i = 0.586(C + C_i)$	$\sigma_{1p} = -2.4142\,\omega_h$ $\omega_{1p} = \pm 1.000\,\omega_h$ $\sigma_{3p} = -1.000\,\omega_h$ $\omega_{3p} = \pm 2.4142\,\omega_h$ $\sigma_z = -6.8284\,\omega_h$	$\lvert F(\omega)\rvert =$ $\sqrt{\dfrac{0.02\,(\omega/\omega_h)^2 + 1}{\left[0.02\,(\omega/\omega_h)^4 - 0.49\,(\omega/\omega_h)^2 + 1\right]^2 + \left[(\omega/\omega_h) - 0.14\,(\omega/\omega_h)^3\right]^2}}$ $\eta_b = 2.61$
	MFED values	poles & zeros	step-response
	$T = R(C + C_i)$ $L_1 = 0.100R^2(C + C_i)$ $L_2 = 0.463R^2(C + C_i)$ $C_i = 0.7101\,(C + C_i)$	$\sigma_{1p} = -2.8962/T$ $\omega_{1p} = \pm 0.8672/T$ $\sigma_{3p} = -2.1038/T$ $\omega_{3p} = \pm 2.6574/T$ $\sigma_z = -10.0/T$	$f(t) = 1 + 4.0525\,\mathrm{e}^{-2.8976\,t/T}\sin(0.8649\,t/T + 0.6080 + \pi) +$ $+\,1.3733\,\mathrm{e}^{-2.1024\,t/T}\sin(2.6573\,t/T - 1.2780 + \pi)$ $\eta_r = 2.17$ $\delta = 0.94\,\%$

Table 2.10.1 : Summary of all circuits discussed (continued)

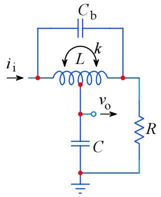
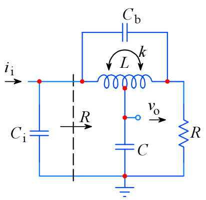
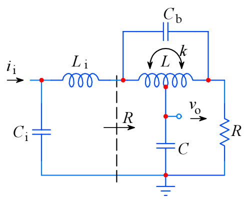
2-pole T-coil Peaking	MFA values	poles	frequency-response
	$\omega_h = 1/RC$ $L = R^2 C$ $k = 0.33$ $C_b = 0.125\,C$	$\sigma_{1p} = -2\,\omega_h$ $\omega_{1p} = \pm 2\,\omega_h$	$\lvert F(\omega)\rvert = \dfrac{1}{\sqrt{1 + 15.62 \cdot 10^{-3} (\omega/\omega_h)^4}}$ $\eta_b = 2.83$
	MFED values	poles	step-response
	$T = RC$ $L = R^2 C$ $k = 0.5$ $C_b = 0.083\,C$	$\sigma_{1p} = -3/T$ $\omega_{1p} = \pm\sqrt{3}/T$	$f(t) = 1 + 2\,e^{-3t/T} \sin(\sqrt{3}\;t/T + 0.5236 + \pi)$ $\eta_r = 2.72 \qquad \delta = 0.43\,\%$
3-pole T-coil Peaking	MFA values	poles	frequency-response
	$\omega_h = 1/R(C + C_i)$ $L = R^2 C$ $k = 0$ $C_b = 0.25\,C$	$\sigma_{1p} = -1.5\,\omega_h$ $\omega_{1p} = \pm 2.6\,\omega_h$ $\sigma_{3p} = -3\,\omega_h$	$\lvert F(\omega)\rvert = \dfrac{1}{\sqrt{1 + 1.367 \cdot 10^{-3} (\omega/\omega_h)^6}}$ $\eta_b = 3$
	MFED values	poles	step-response
	$T = 1/R(C + C_i)$ $L = R^2 C$ $k = 0.35$ $C_b = 0.119\,C$ $C_i = 0.28\,(C + C_i)$	$\sigma_{1p} = -2.886/T$ $\omega_{1h} = \pm 2.7532/T$ $\sigma_{3p} = -3.6447/T$	$f(t) = 1 + 1.8489\,e^{-2.886\,t/T} \sin(2.7532\,t/T - 0.54 + \pi)$ $- 1.9507\,e^{-3.6447\,t/T}$ $\eta_r = 2.78 \qquad \delta = 0.75\,\%$

Table 2.10.1 : Summary of all Inductive Peaking Circuits (continued)

4-pole T-coil Peaking	MFA values	poles	frequency-response
	$\omega_h = 1/R(C+C_i)$ $L = R^2C$ $k = 0.55$ $C_b = 0.073C$ $L_i = 1.71\,R^2C_i$ $C_i = 0.17\,(C+C_i)$	$\sigma_{1p} = -4.121\,\omega_h$ $\omega_{1p} = \pm 1.0707\,\omega_h$ $\sigma_{3p} = -1.707\,\omega_h$ $\omega_{3p} = \pm 4.121\,\omega_h$	$\lvert F(\omega)\rvert = \dfrac{1}{\sqrt{1+6.387\cdot 10^{-6}\,(\omega/\omega_h)^8}}$ $\eta_b = 4.46$
	MFED values	poles	step-response
	$T = R(C+C_i)$ $L = R^2C$ $k = 0.57$ $C_b = 0.068\,C$ $L_i = 0.65\,R^2C_i$ $C_i = 0.22\,(C+C_i)$	$\sigma_{1p} = -4.7317/T$ $\omega_{1p} = \pm 1.4167/T$ $\sigma_{3p} = -3.4376/T$ $\omega_{3p} = \pm 4.3419/T$	$f(t) = 1 + 5.6632\,e^{-4.7317\,t/T}\sin(1.4167\,t/T + 0.4866 + \pi) +$ $+ 1.6484\,e^{-3.4376\,t/T}\sin(4.3419\,t/T + 1.5389)$ $\eta_r = 3.45$ $\delta = 0.83\,\%$