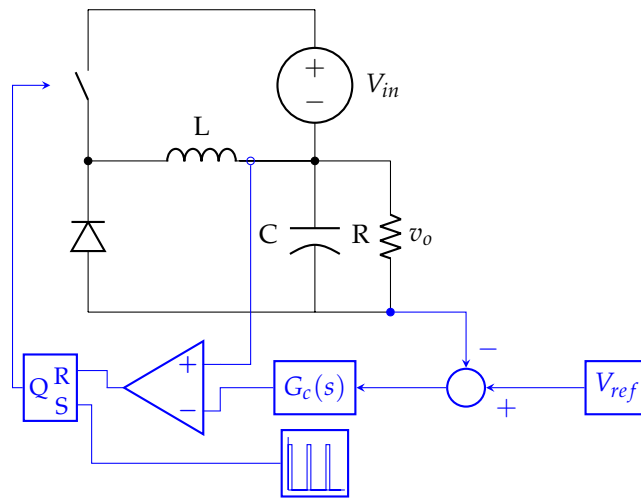


DIGITAL CONTROL OF POWER ELECTRONICS

Current Mode Control of Buck-Boost Converter



```

1  %% BuckBoost current mode control
2  clear
3  Vin = 10
4  Vo = 10
5  d = 0.5
6  L = .5*100e-6
7  C = 247e-6
8  r = 0.01
9  Po = 20
10 fsw = 200e3
11 R = Vo^2/Po
12
13 Le = L / (1-d)^2
14
15 % plant transfer function
16
17 s=tf('s');
18 opts = bodeoptions('cstprefs');
19 opts.FreqUnits = 'Hz';
20 %opts.PhaseWrapping = 'on';
21
22 Gp = R*(1-d)*(1 - s*d*L/(R*(1-d)^2)) * (1+s*r*C) / ( (1+d) * (1 + (1/(1+d)
    )*s*R*C) )
23 bode(Gp,opts)
24 grid on
25 poles = pole(Gp)
26 zeros = zero(Gp)
27
28
29 % design controller
30
31 fc = 1000
32 pm = 60

```

```

33 kfb = 1
34 Gpwm = 1
35
36 [gain_gp angle_gp] = bode(Gp,2*pi*fc)
37 angle_gp=angle_gp-360
38 phiboost = -90 +pm-angle_gp
39 gain_need = 1/gain_gp
40 Kboost = tand(45+phiboost/2)
41 fz = fc/Kboost
42 fp = Kboost*fc
43 kc = 2*pi*fz/gain_gp
44 wz = 2*pi*fz
45 wp = 2*pi*fp
46
47 Gc = kc/s * (1+s/(2*pi*fz)) / ((1+s/(2*pi*fp)));

```

$$G_p(s) = -\frac{(1.54375 \times 10^{-10} s^2 + 0.00005478125 s - 3.125)}{0.00154375 s + 1.875} \quad (1)$$

$$\omega_p = 20131.3191, \omega_z = 1961.0447, k = 6150.4373 \quad (2)$$

$$p_1 = -8460.73028 + 6198.70428i, p_2 = -8460.73028 - 6198.70428i, p_3 = -2292.8634 \quad (3)$$

