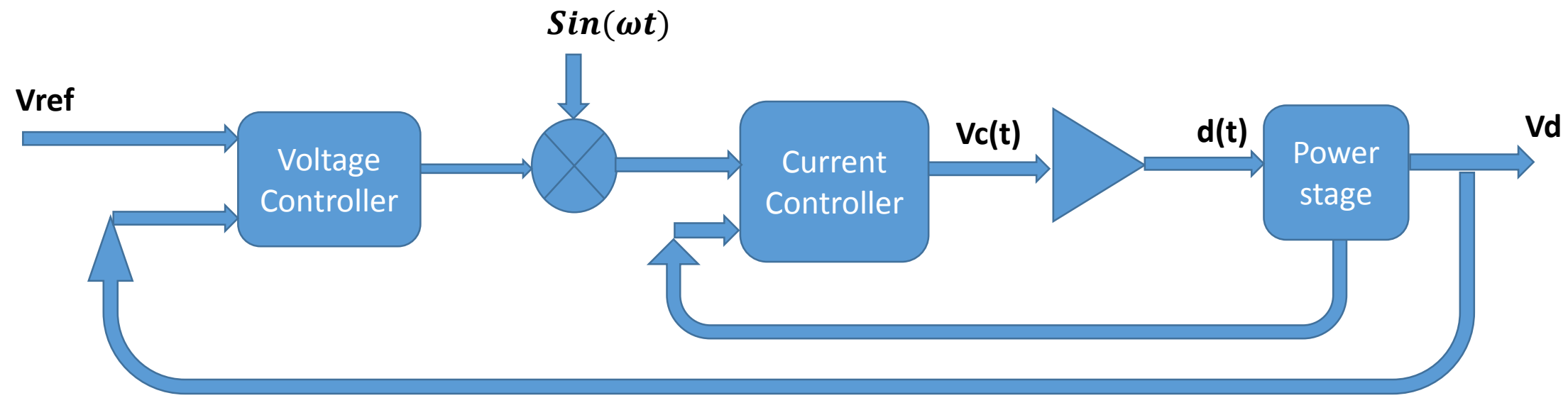




$$\bar{i}_d(t) = (1-d)\bar{i}_L(t) = \frac{\hat{V}_s}{V_d} \hat{I}_L |\sin \omega t|^2$$

$$\bar{i}_d = \underbrace{\frac{1}{2} \frac{V_s}{V_d} \hat{I}_L}_{I_d} - \underbrace{\frac{1}{2} \frac{V_s}{V_d} \hat{I}_L \cos 2\omega t}_{i_{d2}(t)}$$

DC component
Which goes
through R

AC component
Which goes
through C

We want the O/P of the PFC as below:

$$|v_s(t)| = \hat{V}_s |\sin(\omega t)|$$

$$i_L(t) = \hat{I}_L |\sin(\omega t)|$$

Outer Voltage loop transfer function

$$\frac{\tilde{v}_d(s)}{\hat{I}_L(s)} = \frac{1}{2} \frac{\hat{V}_s}{V_d} \frac{R}{1+sRC}$$

Inner Current transfer function

$$\frac{\tilde{i}_L(s)}{\tilde{d}(s)} \simeq \frac{V_d}{sL_d}$$

Power Stage transfer function

$$\frac{\tilde{d}(s)}{\tilde{v}_c(s)} = \frac{1}{\hat{V}_r}$$

