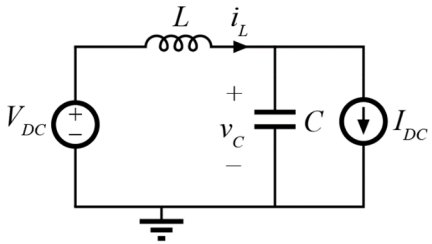
Resonant Circuit Solution



$$v_c(t) = V_{DC} + (V_0 - V_{DC})\cos\left(\frac{t}{\sqrt{LC}}\right) + (I_0 - I_{DC})\sqrt{\frac{L}{C}}\sin\left(\frac{t}{\sqrt{LC}}\right)$$

$$i_L(t) = I_{DC} + (I_0 - I_{DC})\cos\left(\frac{t}{\sqrt{LC}}\right) + (V_{DC} - V_0)\sqrt{\frac{C}{L}}\sin\left(\frac{t}{\sqrt{LC}}\right)$$

Normalization and Notation

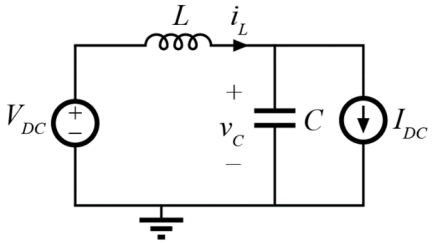
$$v_c(t) = V_{DC} + (V_0 - V_{DC})\cos(\omega_0 t) + R_0(I_0 - I_{DC})\sin(\omega_0 t)$$

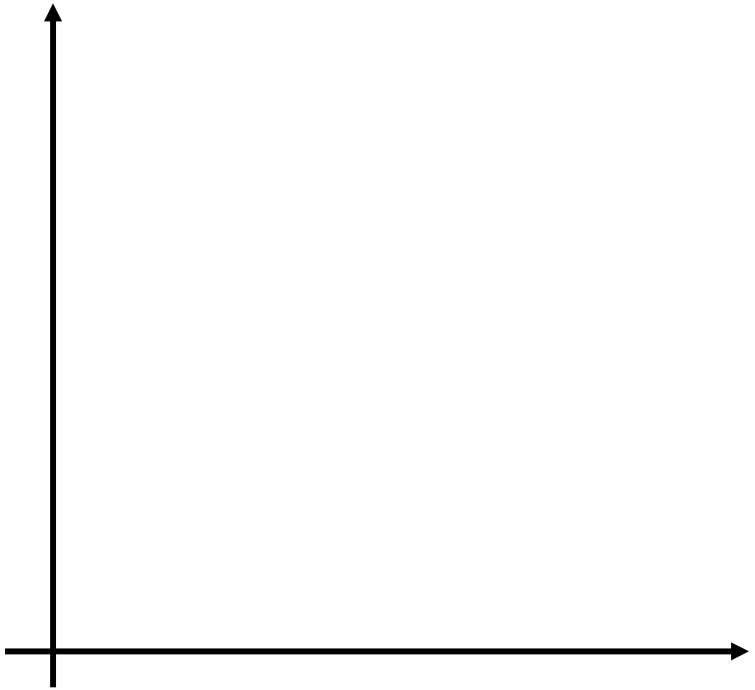
$$i_L(t) = I_{DC} + (I_0 - I_{DC})\cos(\omega_0 t) + \frac{1}{R_0}(V_{DC} - V_0)\sin(\omega_0 t)$$

$$v_c(t) = V_{DC} + (V_0 - V_{DC})\cos(\omega_0 t) + R_0(I_0 - I_{DC})\sin(\omega_0 t)$$

$$i_L(t) = I_{DC} + (I_0 - I_{DC})\cos(\omega_0 t) + \frac{1}{R_0}(V_{DC} - V_0)\sin(\omega_0 t)$$

State Plane Analysis

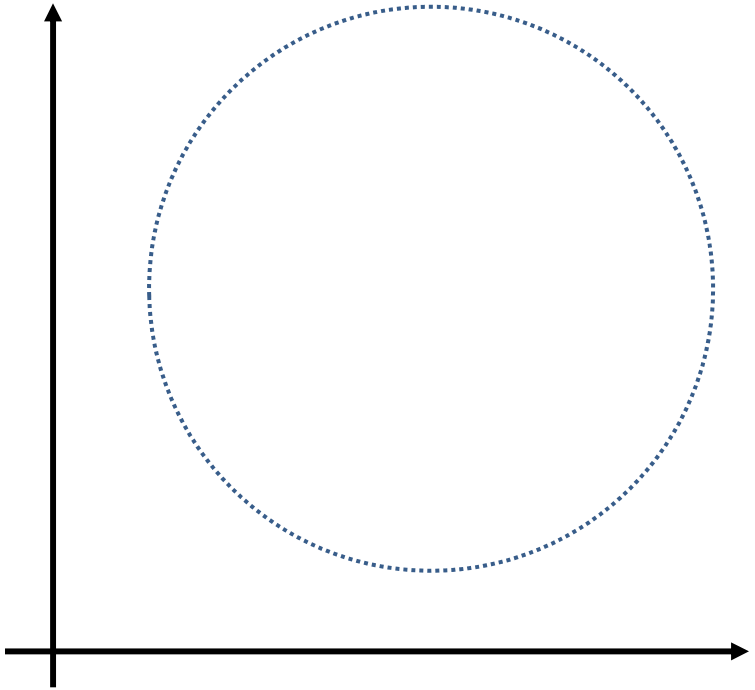




[1] R. Oruganti and F. C. Lee, “Resonant Power Processors, Part I – State Plane Analysis”, Industry Applications, IEEE Tran. on, vol. 21, no. 6, nov 1985.

[2] D. P. Atherton, Nonlinear Control Engineering. London: Van Nostrand Reinhold, 1982, Ch. 2.

Example Analysis



State Plane Algorithm