

Current Source Inverter - 1 (PE_CSI_1.sqproj)

Question: For the current source inverter shown in Fig. 1,

- (a) Find the RMS value of the output current and the switch current.
- (b) Find the RMS value of the fundamental component of the output current.

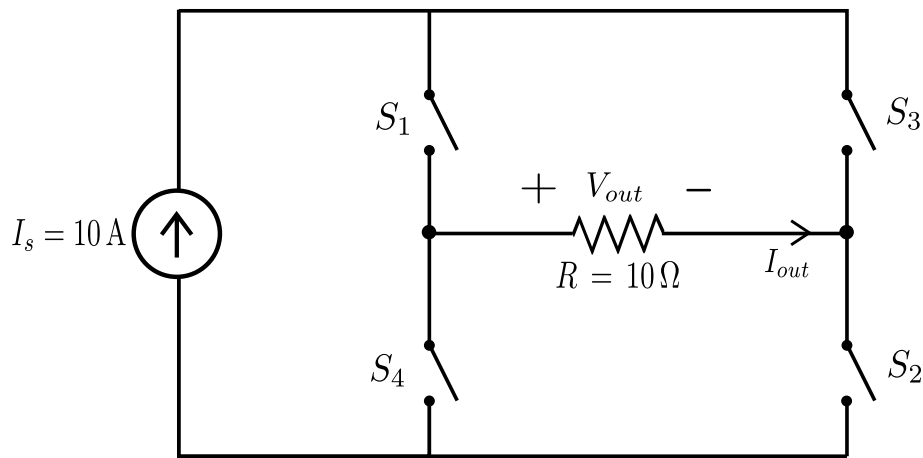


Figure 1: Current Source inverter with R load

Solution:

- (a) For the circuit shown in Fig. 1, the switches S_1 and S_2 conduct from $\omega t = 0$ to π and switches S_3 and S_4 conduct from $\omega t = \pi$ to 2π . The output current $I_{out} = I_s$ for $\omega t = 0$ to π and $I_{out} = -I_s$ for $\omega t = \pi$ to 2π . The output current and switch current waveforms are as shown in Fig. 2. The RMS value of the output current,

$$I_{out} = I_s = 10\text{ A} \quad (1)$$

The RMS value of the switch current,

$$I_{out} = I_s \sqrt{\frac{1}{2}} = 7.07 \text{ A} \quad (2)$$

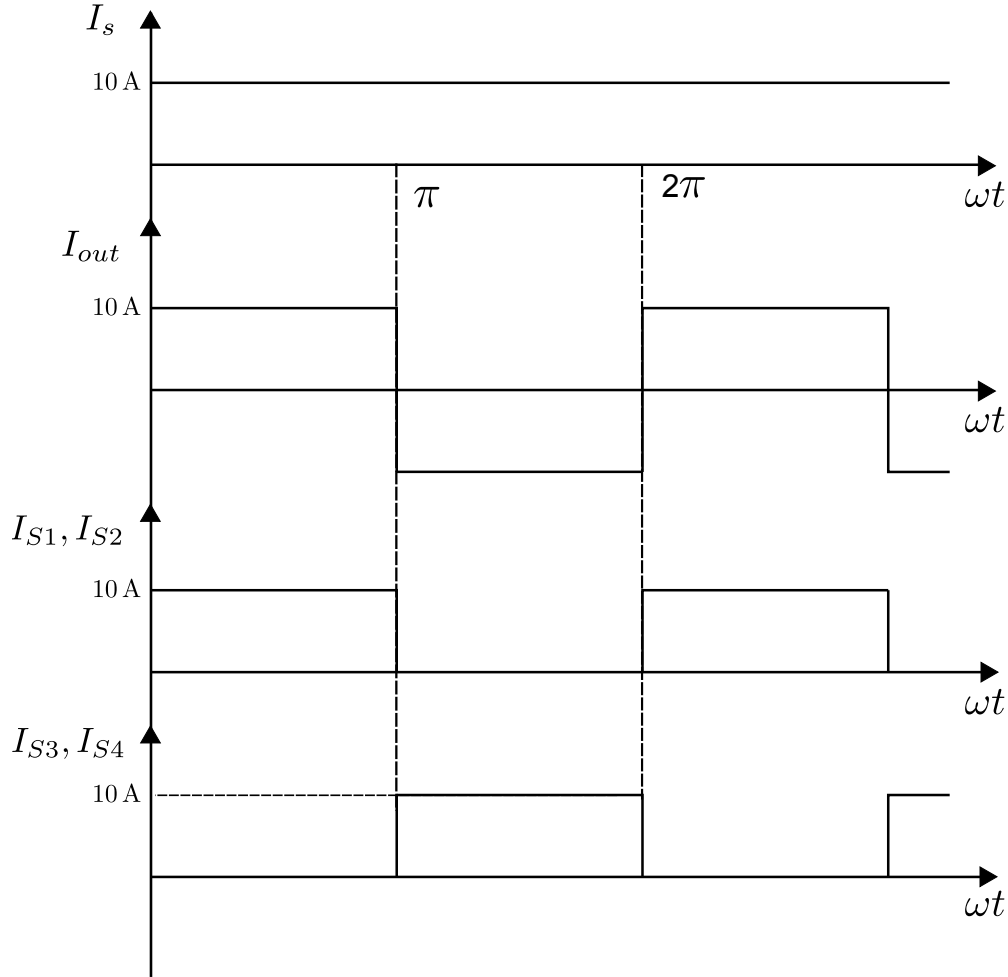


Figure 2: waveforms of current Source inverter with R load

(b) The Fourier series expression for the output current shown in Fig. 2,

$$I_{out} = \sum_{n=2k+1}^{\infty} \frac{4I_s}{n\pi} \sin(n\omega t) \quad (3)$$

Substituting $n = 1$, the RMS value of the fundamental component of the output current,

$$I_{o1} = \frac{2\sqrt{2}}{\pi} I_s = 9 \text{ A} \quad (4)$$

The fundamental component of the output power,

$$P_{o1} = I_{o1}^2 R = 810 \text{ W} \quad (5)$$

SequelApp Exercises:

For the circuit shown in Fig. 1, find the following if the fundamental component of the output current is 10 A.

- (a) The RMS value of the output current.
- (b) The RMS value of the switch current.

Verify your answers using SequelApp.