Example 3-3: Consider a cosine wave $x(t) = 6\cos(250\pi t)$ that is delayed by $\tau_d = 2$ ms, which is one quarter of its period. The spectrum set of $x(t)$ is $\mathcal{S} = \{(125, 3), (-125, 3)\}$. In the spectrum of $x(t-0.002)$ the phase change for the $f = +125$-Hz term is

$$e^{-j250\pi(0.002)} = e^{-j0.5\pi} = -j$$

Thus the spectrum of $x(t - 0.002)$ can be written as the spectrum set $\mathcal{S} = \{(125, -3j), (-125, 3j)\}$. It should be easy to verify that

$$x(t - 0.002) = 6\sin(250\pi t)$$

This result is consistent with the fact that a quarter cycle delay of a cosine wave is a sine wave.

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