MULTISIM DEMO 5.3: INDUCTORS IN MULTISIM

The past several Demos have worked with capacitors. Now it is time to work with inductors.

Let's simulate the circuit shown in Fig. 5.3.1 below. See if we can measure the current through the inductor L1 and find the minimum and maximum current which occurs using Transient Analysis.



Build the circuit as shown in Fig. 5.3.2 below. The only real interesting part is how to construct the time-dependent SPDT switch. As you can see, two SPST switches were combined (since that is the only type of Voltage-controlled switch available), and they were set up so that whenever one is on, the other is off. Make sure you get the polarities of the switches' voltage sensors correct! Also notice that the pulse voltage goes from 1 V to - 1 V with a period of 100 ms, and a pulse length of 50 ms. Remember to put a 0 V source in series with the inductor so the current can be referenced.



Set up a Transient Analysis as shown in Fig. 5.3.3 below. Under the Output tab, make sure to select I(v3) because that is the current through the inductor.

Transient Analysis	
Analysis Parameters Output Analysis Options Summary	
Initial Conditions	
Automatically determine initial conditions	
Parameters	
Start time (TSTART) 0 Sec	
End time (TSTOP) 0.3 Sec	
I ✓ Maximum time step settings (TMAX)	
C Minimum number of time points 99	
Maximum time step (TMAX) 1e-005 Sec	
C Generate time steps automatically	
- More options	
Set initial time step (TSTEP)	
) Estimate maximum ume step based on het list (TMAX)	
Simulate OK Cancel Help	
Figure 5.3.3 Transient Analysis parameters.	1

You may notice that there is this mysterious I(11) variable at your disposal under the Output tab. This corresponds to the inductor. Do we even need to add a zero volt source in series with the inductor? Technically no we don't. In Multisim, the inductor has a specific current defined through it, which is demonstrated in Fig 5.3.4. We can reference this just like we reference the current through a Voltage source. However it can be really difficult to distinguish between the short side (+) and the long side (-) of the inductor when it is wired up. As a result, it might be wise to do the zero volt source in series anyways just to remove any doubt of the current direction (although if you like to live dangerously you can ignore this advice).



When we run the Transient Analysis, we obtain the plot depicted Grapher view in Fig. 5.3.5 below. Using the cursors, we can see that the minimum of the current is 19.632 mA and the maximum current is 433.15 mA.



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