Demonstration 72.69 – Large component LRC circuit

\[ \omega_{\text{resonant}} = \frac{1}{\sqrt{LC}} \]

For the values in this circuit, \( \omega_{\text{resonant}} \) is about 395 rad/s, or, dividing by \( 2\pi \), 63 Hz. Line frequency is 60 Hz (377 rad/s). Inserting the iron rod into the inductor raises its effective inductance and thus lowers \( \omega_{\text{resonant}} \) by enough to bring the circuit into resonance. (L needs to be about 0.18 H, or about 12% higher than without the rod.) Inserting the rod further lowers the resonant frequency even more and takes the circuit back out of resonance.