7. Zener (7 points) — *Jaan Kalda.* A Zener diode is connected to a source of alternating current as shown in the figure. The current is sinusoidal $I = I_0 \cos \omega t$ with a constant amplitude. The inductance L of the inductor is such that $L\omega I_0 \gg V_1, V_2$, where V_1 and V_2 are the breakdown voltages ($V_1 > V_2$). The current-voltage characteristic of the Zener diode is shown in the figure. In the following assume that a very long time has passed since the current source was first turned on.

i) *(5 points)* Find the average current $\langle I \rangle$ through the inductor.

ii) *(2 points)* Find the peak-to-peak amplitude of the current changes ΔI in the inductor.

