Problem 7-5

Calculate the ripple voltage in problem 7-2 if the load current is reduced to $I_{oB}/2$.

Solution: $I_o = 0.0377$ A; $\frac{V_o}{V_d} = \frac{5}{12.6} = \frac{D}{D + \Delta_1}$; $\therefore \Delta_1 = 1.52\,D$

Using Eq. 7-14,

$$I_o = 0.0377 = \frac{V_d T_s D \Delta_1}{2L} = \frac{12.6\,D\Delta_1}{2 \cdot 20{,}000 \cdot 0.001} \; ; \quad \therefore \Delta_1 = \frac{0.1197}{D}$$

$0.1197 = 1.52\,D^2$; $D = 0.281$. Using the equation derived in problem 7-4,

$\boxed{\Delta V_o = 1.66 \text{ mV}}$