Ch. 16
C & J Ed. 5

(79) $f' = \frac{v - v_D}{v} f = \frac{9}{10} f$

$1 - \frac{v_D}{v} = \frac{9}{10} \Rightarrow \frac{v_D}{v} = \frac{1}{10} \Rightarrow v_D = \frac{v}{10} = 343\ m/s$

$v^2 = v_0^2 + 2a(\Delta x) \Rightarrow (34.3\ m/s)^2 = 0 + 2 \times (2.81\ m/s^2)\Delta x$

$\Delta x = \frac{(34.3)^2}{2 \times 2.81} = 210\ m$

(91) $f' = \frac{v - v_D}{v - v_s} f = \frac{(343 - 38)}{(343 - 38)} f = f = 860\ Hz$

(102) $2(\Delta x) = vt = (343\ m/s)(0.5805) = 199\ m$

$\Delta x = 99.5\ m.$

$v = \sqrt{\frac{\gamma k T}{m}} \Rightarrow \frac{v_2}{v_1} = \sqrt{\frac{T_2}{T_1}} = \sqrt{\frac{298}{293}} = 1.0085$

$v_2 = 1.0085\, v_1 = 1.0085 \times 343 = 345.91$

$(\Delta x)' = \frac{1}{2} v_2 t = 100.315\ m$

$\%\ Error = \frac{100.3 - 99.5}{\frac{1}{2}(100.3 + 99.5)} \times 100$

$= 0.8\%$

(87) $\beta_2 - \beta_1 = 10 \log \frac{I_2}{I_1}$

$1.0 = 10 \log \frac{I_2}{I_1} \Rightarrow \log \frac{I_2}{I_1} = 0.1$

$\frac{I_2}{I_1} = 1.26 \simeq 1.3$

(54) $Energy = I A t$

$4800\ J = \left(5.9 \times 10^3 \frac{W}{m^2}\right) \pi (1.8 \times 10^{-2}\ m)^2 t$

$t = \frac{4800 \times 10}{(5.9)(1.8)^2 \pi} = 799.3\ s = 800\ s.$