What is $\mathcal{L}^{-1}\{H(s)\}$ where $H(s) = \dfrac{1}{s(s^2+2s+10)}$?

$$H(s) = \frac{1}{10}\cdot\frac{1}{s} - \frac{1}{10}\,\frac{s}{s^2+2s+10} - \frac{1}{5}\cdot\frac{1}{s^2+2s+10}$$

$$= \frac{1}{10}\cdot\frac{1}{s} - \frac{1}{10}\,\frac{s}{s^2+2s+1+9} - \frac{1}{5}\cdot\frac{1}{(s+1)^2+3^2}$$

$$= \frac{1}{10}\cdot\frac{1}{s} - \frac{1}{10}\,\frac{s+1-1}{(s+1)^2+9} - \frac{1}{5}\cdot\frac{1}{(s+1)^2+3^2}$$

$$= \frac{1}{10}\cdot\frac{1}{s} - \frac{1}{10}\,\frac{s+1}{(s+1)^2+9} + \frac{1}{10}\cdot\frac{1}{(s+1)^2+3^2} - \frac{1}{5}\cdot\frac{1}{(s+1)^2+3^2}$$

$$= \frac{1}{10}\cdot\frac{1}{s} - \frac{1}{10}\,\frac{s+1}{(s+1)^2+3^2} - \frac{1}{10}\cdot\frac{1}{(s+1)^2+3^2}$$

$$= \frac{1}{10}\cdot\frac{1}{s} - \frac{1}{10}\,\frac{s+1}{(s+1)^2+3^2} - \frac{1}{10}\cdot\frac{3}{(s+1)^2+3^2}\cdot\frac{1}{3}$$

$$h(t) = \frac{1}{10} - \frac{1}{10}\,e^{-t}\cos(3t) - \frac{1}{30}\cdot e^{-t}\sin 3t$$