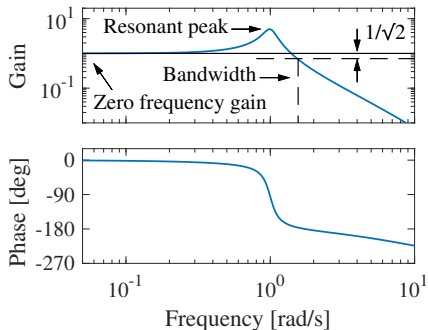


(a) Input/output response



(b) Frequency response

**Figure 6.11:** Steady-state response of an asymptotically stable linear system to a sinusoid. (a) A sinusoidal input of magnitude  $A_u$  (dashed) gives a sinusoidal output of magnitude  $A_y$  (solid), delayed by  $\Delta T$  seconds. (b) Frequency response, showing gain and phase. The gain is given by the ratio of the output amplitude to the input amplitude,  $M = A_y/A_u$ . The phase lag is given by  $\theta = -2\pi\Delta T/T$ ; it is negative for the case shown because the output lags the input.