

Special Problem II.A-20

A **low-pass filter** has a complex transfer function:

$$S_{21}(\omega) = \frac{2\pi \times 10^6}{\sqrt{\omega^2 + 4\pi^2 \times 10^{12}}} e^{j(10^{-10}\omega^2 + 10^{-6}\omega)}$$

- A. Determine the **3dB (i.e., half-power) bandwidth** of this filter.
- B. Determine the **delay** of this filter.
- C. Is this a **linear phase filter** ?