Special Problem II.A-20

A low-pass filter has a complex transfer function:

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

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?