

**7.23** The skin depth of a certain nonmagnetic conducting material is  $2\text{ }\mu\text{m}$  at 2 GHz. Determine the phase velocity in the material.

**Solution:** For a good conductor,  $\alpha = \beta$ , and for any material  $\delta_s = 1/\alpha$ . Hence,

$$u_p = \frac{\omega}{\beta} = \frac{2\pi f}{\beta} = 2\pi f \delta_s = 2\pi \times 5 \times 10^9 \times 2 \times 10^{-6} = 6.28 \times 10^4 \quad (\text{m/s}).$$

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