

## DRILL PROBLEMS : CHAPTER 2

### D2.1

$$(a) \quad \mathbf{R}_{AB} = (5+6) \mathbf{a}_x + (8-4) \mathbf{a}_y + (-2-7) \mathbf{a}_z = 11\mathbf{a}_x + 4\mathbf{a}_y - 9\mathbf{a}_z$$

$$(b) \quad R_{AB} = \sqrt{11^2 + 4^2 + 9^2} = 14.76 \text{ m}$$

$$(c) \quad F_{BA} = \frac{(-20 \times 10^{-6})(50 \times 10^{-6})}{4\pi \frac{(10^{-9})}{36\pi} (14.76^2)} a_{BA} = -0.0413 \frac{(-11a_x - 4a_y + 9a_z)}{14.76} = 30.78a_x + 11.19a_y - 25.18a_z \text{ mN}$$

$$(d) \quad F_{BA} = \frac{(-20 \times 10^{-6})(50 \times 10^{-6})}{4\pi \times 8.854 \times 10^{-12} (14.76^2)} a_{BA} = -0.04125 \frac{(-11a_x - 4a_y + 9a_z)}{14.76} = 30.74a_x + 11.18a_y - 25.15a_z \text{ mN}$$

### D2.2

$$(a) \quad \mathbf{r} - \mathbf{r}_A = -25a_x + 30a_y - 15a_z, \quad |\mathbf{r} - \mathbf{r}_A| = 41.43$$

$$\mathbf{r} - \mathbf{r}_B = 10a_x - 8a_y - 12a_z, \quad |\mathbf{r} - \mathbf{r}_B| = 17.54$$

$$E_A = -1.57 \frac{(-25a_x + 30a_y - 15a_z)}{41.43} = 9480a_x - 11300a_y + 5600a_z$$

$$E_B = 14.61 \frac{(10a_x - 8a_y - 12a_z)}{17.54} = 83300a_x - 66600a_y - 99900a_z$$

$$E_T = E_A + E_B = 9248a_x - 77.9a_y - 94.3a_z \frac{\text{kV}}{\text{m}}$$

$$(b) \quad \mathbf{r} - \mathbf{r}_A = -10a_x + 50a_y + 35a_z, \quad |\mathbf{r} - \mathbf{r}_A| = 61.84$$

$$\mathbf{r} - \mathbf{r}_B = 25a_x + 12a_y + 38a_z, \quad |\mathbf{r} - \mathbf{r}_B| = 47.04$$

$$E_A = -7050 \frac{(-10a_x + 50a_y + 35a_z)}{61.84} = 1140a_x - 5700a_y - 3990a_z$$

$$E_B = 20300 \frac{(25a_x + 12a_y + 38a_z)}{47.04} = 10700a_x + 5180a_y + 16400a_z$$

$$E_T = E_A + E_B = 1184a_x - 52a_y + 1241a_z \frac{\text{kV}}{\text{m}}$$

### D2.3

$$(a) \quad \text{Sum} = 2 + 0 + \frac{2}{5} + 0 + \frac{2}{17} + 0 = 2.517$$

$$(b) \quad \text{Sum} = \frac{1.1}{11.18} + \frac{1.01}{22.62} + \frac{1.001}{46.05} + \frac{1.0001}{89.44} = 0.1755$$



# Electromagnetic Wave Theory Solution Manual

**Michael Rajnik**



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Ball,Vladimir Bolotnikov,J. William Helton,Leiba Rodman,Ilya M. Spitkovsky,2011-02-03 This is the second volume of a collection of original and review articles on recent advances and new directions in a multifaceted and interconnected area of mathematics and its applications It encompasses many topics in theoretical developments in operator theory and its diverse applications in applied mathematics physics engineering and other disciplines The purpose is to bring in one volume many important original results of cutting edge research as well as authoritative review of recent achievements challenges and future directions in the area of operator theory and its applications      *Radiative Heat Transfer* Michael F. Modest,Sandip

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