Fundamentals of Nanoelectronics, I: The New Perspective

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L1.8 Quiz

Answers

1.8. Angular Averaging

1.8a. In a 2D conductor the angular average of $\left\langle \nu_x^2 + \nu_y^2 \right\rangle$ is

(a) ν^2

(b) $\dfrac{\nu^2}{2}$

(c) 0

(d) $\dfrac{2\nu^2}{3}$

(e) none of the above

Explanation: $\left\langle \nu_x^2 + \nu_y^2 \right\rangle = \dfrac{1}{2\pi} \displaystyle\int_{-\pi}^{+\pi} d\theta \left(\nu^2 \cos^2\theta + \nu^2 \sin^2\theta \right) = \nu^2$

1.8b. In a 2D conductor the angular average of $\left\langle \nu_x \nu_y \right\rangle$ is

(a) ν^2

(b) $\dfrac{\nu^2}{2}$

(c) 0

(d) $\dfrac{2\nu^2}{3}$

(e) none of the above

Explanation: $\left\langle \nu_x \nu_y \right\rangle = \dfrac{1}{2\pi} \displaystyle\int_{-\pi}^{+\pi} d\theta\, \nu^2 \cos\theta \sin\theta = \dfrac{\nu^2}{4\pi} \displaystyle\int_{-\pi}^{+\pi} d\theta\, \sin 2\theta = 0$