Consider an electrostatic situation. A point charge $Q$ is located at the center of a thick spherical conducting shell. The net charge on the shell is $-\frac{1}{2}Q$. Let $S$ (dashed circular line) be a concentric spherical surface (Gaussian surface) with a radius $r$.

Find the flux $\Phi_S$ emanating through $S$, the Gaussian surface.

A) $\Phi_S = \frac{Q}{\epsilon_0}$

B) $\Phi_S = \frac{Q}{2\epsilon_0}$

C) $\Phi_S = \frac{3Q}{2\epsilon_0}$

D) $\Phi_S = 0$

E) $\Phi_S = -\frac{Q}{\epsilon_0}$
For an electrostatic case, inside of a conductor or in a conducting medium, $e = 0$. This implies that $\Phi_S = \oint_S \vec{E} \cdot \vec{A} = 0$.

Answer D.

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