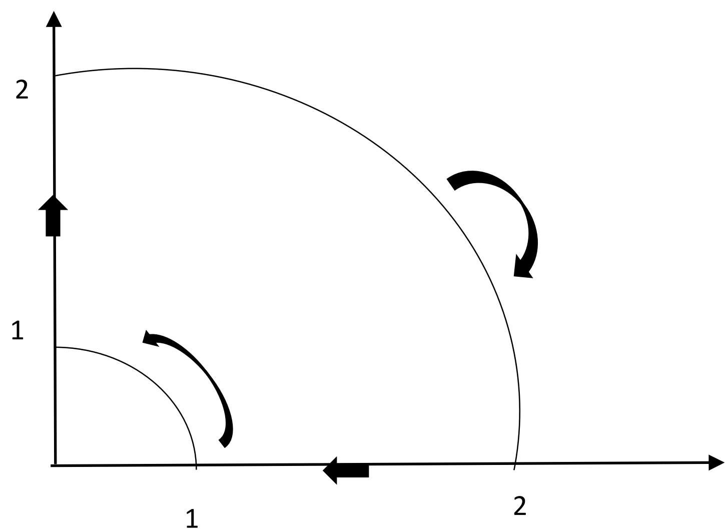
Fields and Waves
Tutorial-4 9th Feb, 2016

Ques1: Verify the divergence theorem for $\vec{D} = \frac{10x^3}{3}\hat{a}_x$ C/sq. m for the volume of a cube, 2m on an edge, centered at the origin and with edges parallel to the axis.

Ques2: Determine the divergence and curl of the given vector fields and evaluate them at specified points.

$$\vec{D} = \rho z \sin\emptyset\,\hat{a}_\rho + 3\rho z^2 \cos\emptyset\,\hat{a}_\emptyset \quad \text{At } (5, {}^{\pi}/_{2}, 1)$$

Ques3: If $\vec{D} = \rho\cos\emptyset\,\hat{a}_\rho + \sin\emptyset\,\hat{a}_\emptyset$ evaluate $\oint \vec{D}.\vec{dl}$ around the path shown below:



Home Assignment to be submitted and discussed during tutorial session.

Ques1 Let $\vec{D} = 2\rho z\hat{a}_\rho + 3z\sin\emptyset\,\hat{a}_\emptyset - 4\rho\cos\emptyset\,\hat{a}_z$. Verify Stokes's theorem for then open surface z=1, 0<ρ<2, $0 < \emptyset < 45^\circ$.

Ques2: If $\vec{r} = x\hat{a}_x + y\hat{a}_y + z\hat{a}_z$ and $\vec{T} = 2zy\hat{a}_x + xy^2\hat{a}_y + x^2yz\hat{a}_z$. Determine

(a) $(\vec{\nabla}.\vec{r})\,\vec{T}$
(b) $(\vec{r}.\vec{\nabla})\,\vec{T}$
(c) $\vec{\nabla}.\vec{r}(\vec{r}.\vec{T})$