Answer on Question #34254, Physics Electric Circuits

 $A \times B = O$, $B \times C = O$, and $A \neq 0$, $B \neq 0$, $C \neq 0$. Find the value of $A \times C$.

Solution

$$\begin{bmatrix} \vec{A} \times \underbrace{\left[\vec{B} \times \vec{C} \right]}_{=0} \end{bmatrix} + \begin{bmatrix} \vec{B} \times \left[\vec{C} \times \vec{A} \right] \end{bmatrix} + \begin{bmatrix} \vec{C} \times \underbrace{\left[\vec{A} \times \vec{B} \right]}_{0} \end{bmatrix} = 0 \Rightarrow \begin{bmatrix} \vec{A} \times \vec{0} \end{bmatrix} + \begin{bmatrix} \vec{B} \times \left[\vec{C} \times \vec{A} \right] \end{bmatrix} + \begin{bmatrix} \vec{C} \times \vec{0} \end{bmatrix} = 0$$

$$\begin{bmatrix} \vec{B} \times \left[\vec{C} \times \vec{A} \right] \right] = 0 \Rightarrow - \begin{bmatrix} \vec{B} \times \left[\vec{A} \times \vec{C} \right] \right] = 0$$

Then

$$\begin{bmatrix} \vec{B} \times \left[\vec{C} \times \vec{A} \right] \right] = \vec{C} \underbrace{\left(\vec{B} \cdot \vec{A} \right)}_{\vec{B} || \vec{A}} - \vec{A} \cdot \underbrace{\left(\vec{B} \cdot \vec{C} \right)}_{\vec{B} || \vec{C}} = \vec{C} |\vec{B}| \cdot |\vec{A}| - \vec{A} \cdot |\vec{B}| \cdot |\vec{C}| = |\vec{B}| \underbrace{\left(\vec{C} |\vec{A}| - \vec{A} |\vec{C}| \right)}_{\vec{B} || \vec{A}} = 0$$

$$\begin{vmatrix} \vec{B} | \neq 0 \\ (\vec{C} |\vec{A}| - \vec{A} |\vec{C}|) = 0 \Rightarrow \vec{C} || \vec{A} \Rightarrow \begin{bmatrix} \vec{A} \times \vec{C} \end{bmatrix} = 0$$

Answer: $\left[\vec{A} \times \vec{C}\right] = 0$.