

Answer on Question #34254, Physics Electric Circuits

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

Solution

$$\left[\vec{A} \times \underbrace{[\vec{B} \times \vec{C}]}_{=0} \right] + \left[\vec{B} \times [\vec{C} \times \vec{A}] \right] + \left[\vec{C} \times \underbrace{[\vec{A} \times \vec{B}]}_0 \right] = \vec{0} \Rightarrow [\vec{A} \times \vec{0}] + [\vec{B} \times [\vec{C} \times \vec{A}]] + [\vec{C} \times \vec{0}] = \vec{0}$$
$$[\vec{B} \times [\vec{C} \times \vec{A}]] = \vec{0} \Rightarrow -[\vec{B} \times [\vec{A} \times \vec{C}]] = \vec{0}$$

Then

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

$$|\vec{B}| \neq 0$$

$$(|\vec{C}| |\vec{A}| - |\vec{A}| |\vec{C}|) = 0 \Rightarrow \vec{C} \parallel \vec{A} \Rightarrow [\vec{A} \times \vec{C}] = \vec{0}$$

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