Name(s)	Project Number
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Project Title

Skin Effect: An Examination of the Flow of High-voltage, High-frequency Electricity across the Surface of an Insulator

Abstract

Objectives/Goals
To determine how high-voltage, high-frequency electricity flows across the surfaces of various insulators.

Methods/Materials
Tesla Coil capable of being tuned to approximately 1.5 in arc lengths, testing apparatus for measuring arc lengths, 2 in. diameter semi-circular samples of various materials, electrical tape, and clear spray on lacquer.
 Test sample was placed in test apparatus. Tesla Coil was connected to test apparatus and powered on causing arc across surface of test sample. The arc gap was adjusted to maximum where arcing occurred continuously. Arc length was measured when Tesla Coil was fully powered down.

Results
All insulators that were tested increased the arc length. The hardwood had the greatest effect, increasing the arc length by approximately 5/8 in. None of the lacquer coated metal samples exhibited a flow of electricity across their surfaces. Therefore, those trails are not significant to the main objective.

Conclusions/Discussion
It was hypothesized that all non-conductors would cause a resistance across their surfaces. This hypothesis was disproved. The insulators increased the arc length significantly; however it is unknown exactly why this phenomenon occurs. . It was also hypothesized that a non-conductor applied to the surface of a conductor would affect the arc length differently than the non-conductor itself. This was tested with metal samples coated in lacquer. The lacquer was not effective as an insulator, and still allowed electricity to flow inside the metal.

Summary Statement
Examining the flow of high-voltage, high-frequency electricity across the surfaces of insulators.

Help Received
Physics teacher offered suggestions on write up.