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Measurements of Current Densities and Skin Effects in Current Carrying Conductors Using Electro-optic and Magneto-optic Sensors ANTHONY GARZARELLA, DONG HO WU, Naval Research Lab — In this presentation, we will describe experiments involving all-dielectric electromagnetic field sensors based on electro-optic (EO) and magneto-optic (MO) crystals. EO sensors measure electric fields through the Pockels Effect, while MO sensors measure magnetic fields through the Faraday Effect. These sensors have been attached to optical fibers and calibrated in a variety of radio frequency, pulsed power and microwaves sources ranging in frequencies from dc to 20 GHz and ranging in power from 10^{-4} to 10^{6} Watts. In this talk, we will focus on recent experimental measurements of electric and magnetic fields generated by current carrying conductors. Our EO and MO sensor data, when combined, allows us to determine current densities and current distributions within a conductor cross section. Additionally, skin effects, which are a major source of Joule heating and resistive wear, can be characterized in detail.

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