

# Abstract

**Our research investigates anomalous spatial damping in anisotropic plasmas at finite temperatures, focusing on its relevance in laboratory plasma, particularly laser-plasma interactions guided by the Fermi-Dirac distribution. We derive the dielectric tensor and explore electromagnetic wave behavior, integrating theoretical and numerical analyses. We examine penetration depth, the skin effect, and Cherenkov radiation absorption. Using the Vlasov model, suited for plasma with Fermi-Dirac statistics, we gain insights into particle behavior. Our findings have practical implications, offering insights into electromagnetic radiation penetration at sub-zero temperatures. This research enriches our understanding of complex plasma phenomena and has applications in laboratory plasmas, especially in laser-matter interaction regions.**