# The Computation of Lower Bounds for the Norm of the Index of Refraction in an Anisotropic Media from Far Field Data

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**Abstract**

We consider the scattering of time harmonic electromagnetic plane waves by a bounded, inhomogeneous, anisotropic dielectric medium and show that under certain assumptions a lower bound on the norm of the (matrix) index of refraction can be obtained from a knowledge of the smallest transmission eigenvalue corresponding to the medium and the first Dirichlet eigenvalue of the negative Laplacian on $D$. Since a reconstruction of $D$ can be obtained from the linear sampling method, it is possible to estimate the first Dirichlet eigenvalue. Furthermore, we show that the transmission eigenvalues can be obtained from the far field operator provided that this operator is known for an appropriate range of frequencies.Numerical examples are given showing the efficaciousness of our estimates.