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Numerical Simulation of Optical Propagation through Atmospheric Turbulence PUSHPA RAJ PUDASAINI, UT at San Antonio, MICHAEL VERA, University of Southern Miss, MADHAB POKHERAL, UT at San Antonio — We studied the propagation of optical waves through atmospheric turbulence. The extended random media is modeled by a set of two dimensional thin Gaussian phase screens with the phase power spectral densities appropriate to the natural medium being modeled. We use the spectrum developed by Kolmogorov for the variation of index of refraction. Rather than treat these perturbations throughout the atmosphere, their effect for a portion of the propagation is usually addressed using a phase screen. This modeling method alters the phase of the optical wave at a discrete series of locations, in a way that corresponds to the cumulative impact of the fluctuations. Usually in the interest of the computational efficiency, simulation of the optical travel proceeds by using a position space representation of the wave function at the screen location, then using the Fourier methods to propagate between screens in the wave vector space representation. We used Crank-Nicolson method for simulating the propagation between the screens. We studied the inner scale effect on the irradiance variance for the different strength parameters. Our simulation results bear the strong resemblance to laser propagation experiment over kilometer length path in the atmosphere.

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