



Numerical Investigation of Statistical Turbulence Effects on Beam Propagation through 2-D Shear Mixing Layer

By James C. Bowers

Biblioscholar Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x6 mm. This item is printed on demand - Print on Demand Neuware - A methodology is developed for determining the validity of making a statistical turbulent approach using Kolmogorov theory to an aero-optical turbulent flow. Kolmogorov theory provides a stochastic method that has a greatly simplified and robust method for calculating atmospheric turbulence effects on optical beam propagation, which could simplify similar approaches to chaotic aero-optical flows. A 2-D laminar Navier-Stokes CFD Solver (AVUS) is run over a splitter plate type geometry to create an aero-optical like shear mixing layer turbulence field. A Matlab algorithm is developed to import the flow data and calculates the structure functions, structure constant, and Fried Parameter (r_0) and compares them to expected Kolmogorov distributions assuming an $r^{2/3}$ power law. The range of C_n^2 's developed from the structure functions are not constant with separation distance, and ranged between 10^{-12} - 10^{-10} . There is a consistent range of data overlap within the C_n^2 's derived from various methods for separation distances within the range 0.01m-0.02m. Within this range r_0 is found to be approximately 0.05m which is a reasonable value. This particular 2-D shear mixing layer was...



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