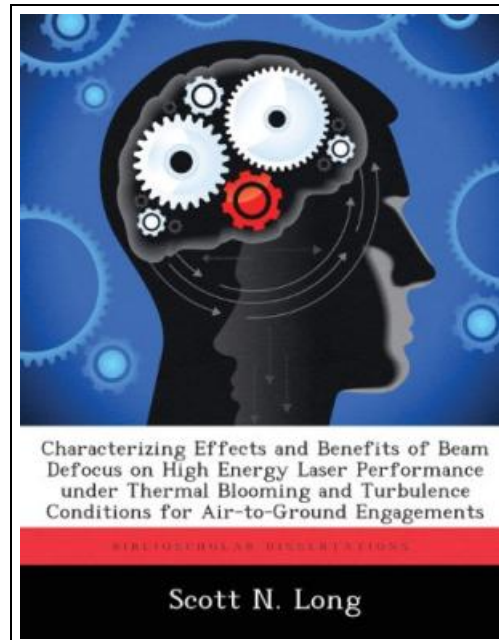


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Biblioscholar, United States, 2012. Paperback. Condition: New. Language: English . This book usually ship within 10-15 business days and we will endeavor to dispatch orders quicker than this where possible. Brand New Book. This dissertation makes contributions towards knowledge of optimizing of laser weapon performance when operating in the air-to-ground (ATG) regime in thermal blooming conditions. Wave optics modeling techniques were used to represent laser weapon performance in a high fidelity sense to allow progress to be made toward improving lower-fidelity scaling laws that can be used in systems level analysis which has need for better representations of thermal blooming. Chemical-oxygen iodine laser (COIL) based weapon systems that operate near the ground will experience thermal blooming due to atmospheric absorption if output power is sufficiently high. The thermal lens in the ATG case is predominantly in the far-field of the optical system which puts the problem outside the envelope for most classical phase correction techniques. Focusing the laser beyond the target (defocus) in the air-to-ground regime is shown to improve irradiance at the target and can be thought of as reducing the thermal blooming distortion number, ND, rather than phase correction. Improvement is shown in a baseline scenario presented and all variations from it explored herein. The Breaux ND is examined for potential use in a defocus scaling law, and a correction factor due to Smith (1977), developed for a different context, is proposed to address deficiencies. Optimal defocus settings and expected improvement are presented as a function of Breaux ND. Also, the generally negative interaction between turbulence and thermal blooming is investigated and shown to further limit performance potential of ATG laser weapons. This negative interaction can impact the weapon design trade space and operational methods for minimizing the interaction and thermal blooming are explored in a case study.



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