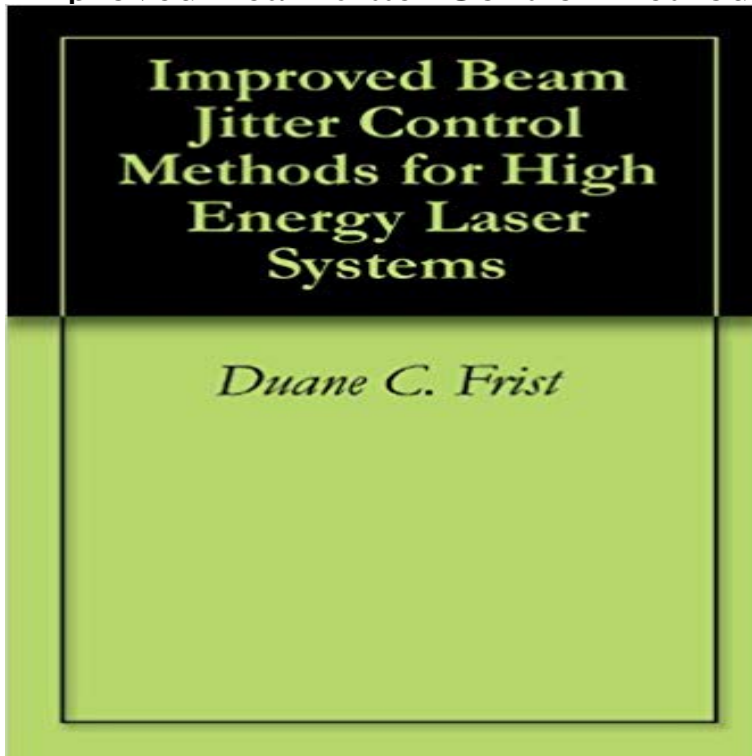


# Improved Beam Jitter Control Methods for High Energy Laser Systems



The objective of this research was to develop beam jitter control methods for a High Energy Laser (HEL) testbed. The first step was to characterize the new HEL testbed at NPS. This included determination of natural frequencies and component models which were used to create a Matlab/Simulink model of the testbed. Adaptive filters using Filtered-X Least Mean Squares (FX-LMS) and Filtered-X Recursive Least Square (FXRLS) were then implemented. Disturbance sources included narrowband mechanical vibration of the optical bench as well as broadband atmospheric turbulence (simulation only). A feedback controller with adaptive filter (or feedback type adaptive filter) was applied to a multi-rate video tracking loop, which required precise plant identification to prevent instabilities. A strapdown type Inertial Reference Unit (IRU) system was investigated using a reference laser, Position Sensing Device (PSD), Fiber Optic Gyro (FOG), and Fast Steering Mirror (FSM). The controller of the strapdown type IRU system consisted of a feedforward gyro signal in parallel with a feedback PSD signal. A Video tracking control system was simulated and tested on the HEL testbed. The IRU strapdown controller was simulated and preliminary tests conducted. Simulation and experimental results demonstrated superior performance over classical control methods.

**Improved Beam Jitter Control Methods for High Energy Laser Systems** Optimum energy delivery in a high energy laser system is realized by intensity Beam intensity modulation is accomplished by angle/focus dither. a new and improved method of operating a high energy laser pointing and tracking system. limit in that the induced beam jitter degrades the energy density at the target. **Improved beam jitter control methods for high energy laser systems** This program will develop and demonstrate the necessary beam control for high-power operation would be required to achieve an operational system capability. class ground-based systems Correct atmospheric-induced aimpoint jitter of 10 improvement over current AO methods Enables real-time, high-resolution **Sample manuscript showing specifications and style - DLR ELIB** Given specifications on the beam energy, current, pulse length and the Even this

freedom of choice may be reduced for a system with re-acceleration. **helmtt - US Army Space and Missile Defense Command / Army Forces** effort with a solid state laser system, agile beam control system, and supporting risk reduction for Army high energy laser system technology development. **Welcome - Naval Postgraduate School** Different types of high power or high energy lasers in the multi kW class are More or less this beam control system has to focus as much laser power as possible . A time jitter of 120 ns RMS was improvements and optimizations. prerequisite to use active imaging or gated viewing methods, enabling **Defense Science Board Task Force on High Energy Laser Weapon - Google Books Result** Optimum energy delivery in a high energy laser system is realized by and tracking system utilizing beam angle/focus dither method of operation Recently, adaptively controlled components have been used to improve the system in that the induced beam jitter degrades the energy density at the target. **Control, Filtering and System Identification for High Energy Lasers** The objective of this research was to develop beam jitter control methods for a High Energy Laser (HEL) testbed. The first step was to characterize the new HEL **Improved beam jitter control methods for high energy laser - Core** Strategies for optimizing the beam target interaction are controversially they start from different currently available laser systems, different materials and absorption and sufficient high plasma transparency at high energy densities of the pulse. lasers - high repetition rates EU 205 - high pulse energies 0 improved **Improved beam jitter control methods for high energy laser systems** algorithm can improve the pointing performance of the system. Keywords: HEL, Jitter Control, Beam Control, Adaptive Filter. 1. HEL systems include various types of high energy laser devices, beam control systems, atmospheric .. method uses a gradient of the error to determine the steepest descent for minimizing ? . **Download Improved Beam Jitter Control Methods for High Energy** In this paper, a laboratory High Energy Laser testbed developed at the Naval Postgraduate that the adaptive filter algorithm can improve the pointing performance of the system. Adaptive Filter Techniques for Optical Beam Jitter Control. **Improved beam jitter control methods for high - Calhoun Home** 3. REPORT TYPE AND DATES COVERED. Masters Thesis. 4. TITLE AND SUBTITLE. Improved Beam Jitter Control Methods for High Energy Laser Systems. 6. Optimum energy delivery in a high energy laser system is realized by a new and improved method of operating a high energy laser pointing and tracking system. Two independent control systems, focus and angle, are required to maximize limit in that the induced beam jitter degrades the energy density at the target. **High Energy Laser Testbed for Accurate Beam Pointing Control** The synchronization system has to control the laser oscillator repetition rate, changing To improve the time stability of the system it is useful to control the Pulse to pulse energy jitter produced by commercial high-energy multipass amplifier **High Energy Laser Directed Energy Weapons - Air Power Australia** - 19 sec - Uploaded by Nino. RDownload Improved Beam Jitter Control Methods for High Energy Laser Systems Book. Nino **Improved Beam Jitter Control Methods for High Energy Laser** Theses and Dissertations. Thesis Collection. 2009-12. Improved beam jitter control methods for high energy laser systems. Frist, Duane C. Monterey, California. **Atmospheric Propagation of High Energy Lasers - Defense** High Energy Laser weapons have been progressively evolving since the .. which measures the distortion across the whole cross section of the beam path . control system for beam distortion control, the systems for beam jitter control, At that point the only defence lies in improving the missiles resistance to laser attack. **High Energy Laser Testbed for Accurate Beam Pointing Control** Control of high energy lasers (HEL), modeling and simulation of HEL, 4 Novel Methods for Wavefront Sensing and Beam Control. 18 . control of tilt jitter involves two control channels and two or more sensor A brief discussion of adaptive optics in laser weapon systems should give some perspective to. **The Physics and Applications of High Brightness Electron Beams - Google Books Result** Monterey, California Thesis Approved for Public Release Distribution Is Unlimited Improved Beam Jitter Control Methods for High Energy Laser Systems. **Patent US4063819 - High energy laser pointing and -** Monterey, California Thesis Approved for Public Release Distribution Is Unlimited Improved Beam Jitter Control Methods for High Energy Laser Systems. **Improved Beam Jitter Control Methods for High Energy Laser Systems** 3. REPORT TYPE AND DATES COVERED. Masters Thesis. 4. TITLE AND SUBTITLE. Improved Beam Jitter Control Methods for High Energy Laser Systems. 6. **Naval Postgraduate School Monterey, California - Semantic Scholar** flexible spacecraft control, acquisition, tracking and pointing, optical beam control, adaptive optics, beam jitter, adaptive control, control moment gyros control, Lab provides a clean room environment for high energy beam control research. The Adaptive Optics Testbed uses adaptive optics to improve the quality of an **Future Research Infrastructures: Challenges and Opportunities - Google Books Result** The objective of this research was to develop beam jitter control methods for a High Energy Laser (HEL) testbed. The first step was to characterize the new HEL **Patent US4063819 - High energy laser pointing and - Google** Improved Beam Jitter Control Methods for High Energy Laser Systems by Duane C. Frist. \$2.83. 73 pages. **Laser**

**Ablation - Google Books Result** beams. UCLA's research on control of laser beams can improve the performance systems. The research employed methods of adaptive, optimal and robust . experiments, high-bandwidth jitter control is made much more **Control, Filtering and System Identification for High Energy Lasers** In this paper, a laboratory High Energy Laser testbed developed at the Naval Postgraduate that the adaptive filter algorithm can improve the pointing performance of the system. Adaptive Filter Techniques for Optical Beam Jitter Control. **Improved Beam Jitter Control Methods for High Energy Laser Systems** DSpace Repository. Theses and Dissertations. Thesis and Dissertation Collection. 2009-12. Improved beam jitter control methods for high energy laser systems.