

DYNAMIC STRUCTURAL PROBLEMS IN LASER FUSION FACILITIES

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SUMMARY

1. A brief summary to date of Laser Fusion work outlining the future impact on energy resources and the state of the art. Comments on different types of Lasers and probable development, touching also on communications and weapons systems.
2. Description of first experimental Glass Laser Facility for Lawrence Livermore Laboratory (University of California) – the Laser Fusion Facility, a 1 Kilojoule proof of principle facility with highly controlled environmental parameters, including control of vibrations from equipment, micro-seismic, and seismic inputs to 3 foot thick by 250 foot long \times 45 foot wide stable platform with optical control (relative angular motion of two arc sections per 20 feet). Trade-off of platform designs and analysis, including computer analysis. In addition, a three dimensional dynamic computer analysis of the Building structure to withstand approximately 50% gravity load of a severe modeled earthquake.
3. Descriptions of second experimental Glass Laser Facility for Lawrence Livermore Laboratory – the High Energy Laser Facility, a 10 Kilojoule Facility to actually develop sufficient energy to demonstrate thermonuclear burn of Deuterium-Tritium pellet. Again close environmental control requirements with control of acoustic and dynamic vibrations of equipment, three dimensional dynamic analysis of complex building structure, and computer analysis of Laser structure base slab to examine response to vibration.
4. Description of experimental Gas Laser Facility for Los Alamos Scientific Laboratory 100 Kilojoule facility to develop sufficient energy for thermonuclear burn of Deuterium-Tritium pellet in a gas environment and vacuum environment. Control of dynamic input to optical equipment.
5. Modification of this Facility for the Chemical (Hydrogen Fluoride) Laser also requiring strict environmental controls for optics.
6. Control of target drift and beam change angle requiring maximum change of 2 seconds of arc in 100 seconds.
7. Consideration of dynamic inputs from equipment loads through volcanic tuff and consideration of three dimensional structural analysis of building structure.
8. Description of computer programs used and analysis, acknowledgement to companies involved in this work and some description of construction involving construction management.

