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The importance of damage tests

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Abstract content
 (Max 300 words)

Damage tests form an integral part of designing any system of apparatus for medical, industrial or personal use. These tests become even more important when the system incorporates a laser. This paper will look at a simple damage test experiments and discuss the parameters to be considered when doing such tests.

Laser based devices rely on optics to deliver the laser light to a site e.g for inspection of a material surface or treatment of skin cancer or even cutting an automobile part. The power required by each of these applications is different. This results in a different level of risk associated with laser power/energy. Probably the most illustrative case is that of a laser system used in manufacturing. Such a system requires high power densities of at least 1 MW.cm^{-2} to e.g weld a material. Now imagine if some element in the laser delivery system were to fail in the assembly and testing of the system or even in the operation of the system. Science fiction would be almost real.

So a few steps to consider for optics or components used in a system would be the application, wavelength of the laser, the power required and duration of operation. This paper describes the process of testing an optic to determine what power density it can withstand. An unspecified mirror was subjected to power densities of $108\text{-}565 \text{ MW.cm}^{-2}$ to determine the suitability of the mirror for high power applications. In this particular case the mirror has not been damaged and can be considered for high power applications or setups.

References

[1] L Lemaître, T Donval, M Loiseau, J C Poncetta1, G Razé, C Meslin, B Bertussi and H Bercegol, 2009, Meas. Sci. Technol. 20 (2009) 095701

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