

High-Power Fibre Lasers for Beam Combination

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Fiber lasers have caught the imagination for applications requiring beam combination up to a 100kW or more. Their near-perfect beam quality, stability and versatility, coupled with the low cost of the gain medium, make them ideal candidates for coherently combining perhaps up to a 100 individual fiber amplifier beams. Using optical fibre circuitry derived from telecommunications, we can envisage all-fibre laser systems which are robust and transportable, with straight-forward management of heat load. The latter attribute comes from the large surface to volume ratio, the efficiency of fiber laser and the thermal stability of silica.

For coherent beam combination, we require single-frequency output in a stable, polarised beam. Progress towards high-power single-frequency lasers will be reviewed, together with the expected limitations to the technology. Recent work on pulsed fiber lasers will also be reviewed, together with prospects for beam combination to overcome the pulse energy limitations that result from the small active volume of the fiber core.