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Aculight Corporation Demonstrates 1-Megawatt Fiber Amplifier

Prototype 1-Megawatt Fiber Device Exhibits Record Peak Spectral Brightness

Bothell, Wash., July 27, 2005 – Aculight Corporation, a leading developer of innovative laser technologies, has demonstrated a 1-megawatt peak-power pulsed fiber amplifier with diffraction-limited beam quality and narrow linewidth. The device's unprecedented peak spectral brightness makes it ideal for many industrial and aerospace applications. Aculight researcher Dr. Fabio Di Teodoro presented results from the system in a paper at the 18th Annual Solid State and Diode Laser Technology Review (SSDLTR) conference this June, in Los Angeles, California.

Aculight's prototype device uses a photonic-crystal fiber amplifier to generate 1064-nm, 450-ps pulses of 1.1-megawatt peak power and 0.54-millijoule energy. It delivers 7 watts of average power at repetition rates over 10 kHz. The device exhibits diffraction-limited beam quality ($M^2 = 1.04$) and narrow spectral linewidth (<10 GHz). It is the first megawatt-level, single-mode fiber amplifier to produce pulses of sub-nanometer linewidth and diffraction-limited beam quality.

“We have successfully combined high peak power with diffraction-limited beam quality and narrow spectral linewidth and that's completely unique,” said Fabio Di Teodoro, senior scientist for Aculight. “This new device marries the advantages of fiber lasers with the power level and brightness necessary for applications such as materials processing. It really opens up new possibilities for high-power, compact, efficient fiber sources in applications that currently rely on bulky and typically expensive non-fiber-based laser systems.”



The new fiber amplifier exhibits all the benefits unique to fiber laser technology. It provides high pulse energy, high peak and average power, spectral purity, and efficiency in a very compact architecture. It is also free from the complexity and thermal-management issues of traditional high-power, solid-state lasers.

Thanks to these characteristics, fiber lasers have long shown potential for industrial, materials processing and government applications that require compact, efficient, low-cost, high-brightness sources. However, fiber lasers have been limited to peak powers of around 100 kilowatts. This is because high-peak-power optical pulses in the fiber core cause unwanted nonlinear optical effects, all leading to severe spectral broadening, performance degradation, and even fiber damage. Aculight's device, on the other hand, uses a novel type of photonic-crystal fiber that enables high-peak-power pulses with narrow spectral linewidth while generating diffraction-limited beam quality.

While Aculight developed the pulsed fiber amplifier for a military customer, the company now plans to further develop the technology so that it can be made available to the commercial marketplace.

Founded in 1993, Aculight Corporation develops and manufactures innovative laser technologies for the industrial, research, government and medical markets. Aculight's technology portfolio includes fiber lasers, diode-pumped solid-state lasers, nonlinear optics, and external cavity diode lasers. For more information about Aculight, please contact Andrew Brown, director of business development, at (425) 482-1100, or visit www.aculight.com.

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