Coherent Wind LIDAR Based on a Coherently-Beam-Combined Pulsed Laser Source. Matthieu Valla, Laurent Lombard, Christophe Planchat, Didier Goular, Béatrice Augère, Pierre Bourdon and Guillaume Canat, ONERA (France)

ABSTRACT

Coherent wind LIDARs are increasingly used for climatic condition and turbulence assessment with applications in wind farm projects optimization or aircraft security during take-off and landing. Laser pulses are sent through the atmosphere and wind speed is measured using Doppler-induced frequency shift on the backscattered laser light. Laser sources with excellent spatial beam quality, narrow linewidth and typical pulse duration ranging from ~100 ns to 1 µs are required. Pulsed master oscillator power fiber amplifier (MOPFA) at 1.5 µm are well adapted, versatile sources but with peak power limited to a few 100s W by nonlinear effects in standard fibers.

In this paper, we report on a coherent wind LIDAR based on a pulse laser source made of two coherently-beam-combined amplifiers. The LIDAR performances are compared using the combined-amplifier and the single-amplifier of the same power. The carrier to noise ratio (CNR) and wind speed accuracy of both operating modes are presented.