

Abstract

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High performance characteristics of dual pumped Er³⁺/Yb³⁺ Co-doped/Raman hybrid optical amplifier

In this paper, a hybrid optical amplifier is suggested comprising an Er³⁺/Yb³⁺ co-doped fiber amplifier (EYCDFA) as a preamplifier and a Raman fiber amplifier (RA) as a post amplifier. The performance characteristics of the hybrid amplifier (EYCDRHA) are theoretically and experimentally studied including gain and noise figure. In the theoretical model, the amplified spontaneous emission (ASE) as well as the background losses and the up-conversion effect between Er³⁺ ions and Yb³⁺ ions are taken into consideration. The performance characteristics are investigated using dual pump configuration, forward EYCDFA pump at 980 nm and backward RA pump at 1450 nm at different values of input signal power, EYCDFA and RA pump powers and lengths at two different values of input signal wavelength 1530 and 1600 nm. A high gain and low noise performance are obtained for the suggested amplifier. Furthermore, a good agreement between the theoretical and experimental values of the gain and noise figure at the input parameters is obtained.