4. Conclusion

We have demonstrated that the longitudinal signal power profile along a transmission link can be effectively designed to reduce the nonlinear penalties in a coherently-detected 112 Gb/s PM-mQAM system employing digital back-propagation. We have qualitatively confirmed that our simulation results are consistent with analytical predictions of the dominant nonlinear effect (signal-noise four-wave mixing in this case). In particular, performance improvements up to 0.6 dB have been reported for an optimized power profile with a single-step amplifying stage (4 dB) positioned at $2/3^{rd}$ of the total transmission reach for a variety of modulation formats, enabling BER at FEC threshold of $1.5x10^{-3}$. More complex power profile optimization involving greater than one amplifier would be the subject of a subsequent study. In the view of near future optical network deployments, we believe that single/multi-step power profile optimization would significantly improve the transmission performance.

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