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Nonlinear Damage Compensation using Support Vector Regression

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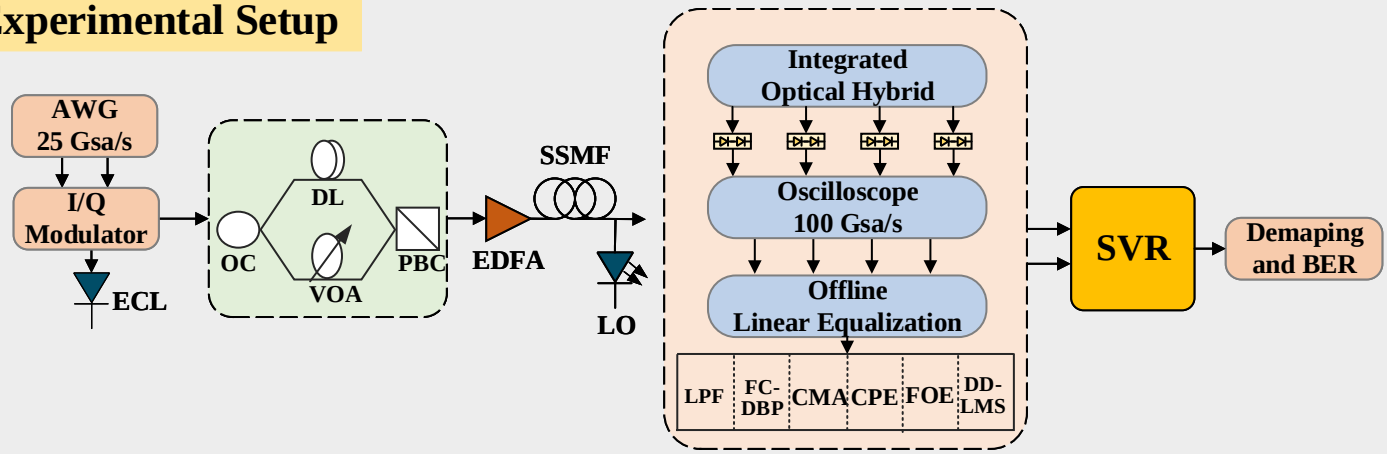
Abstract

In this paper, a nonlinear equalizer based on perturbation theory and support vector regression is proposed and experimentally demonstrated for 64-QAM coherent optical communication system. Compared with ridge regression, better BER performance is obtained.

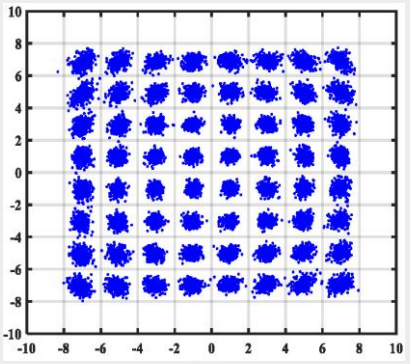
Keywords- *optical fiber nonlinearity; support vector regression; perturbation theory*.

Experimental Setup

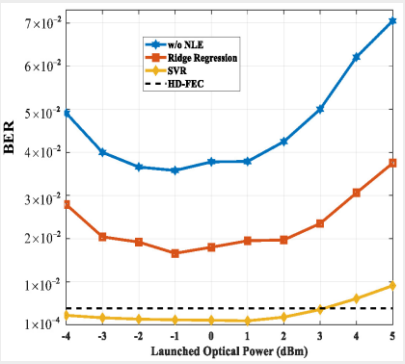


Experimental Results

It is clear that, the ridge regression based equalizer cannot get a BER below the HD-FEC limit of 3.8×10^{-3}, while SVR based equalizer performs quite well. When the launched optical power (LOP) is in the range of -4 dBm to 3 dBm， SVR based equalizer can greatly improve the BER to below HD-FEC limit of 3.8×10^{-3}.



Constellation before and after SVR compensation at 0 dBm



BER against LOP

Conclusion

In this paper, a SVR based equalizer is proposed for nonlinear compensation of 64-QAM coherent optical communication system. The experimental results validate the proposed algorithm has the good compensation coefficient. The result shows that when the launched power ranges from -4 dBm to 3 dBm， SVR based equalizer can greatly improve the BER to below HD-FEC limit of 3.8×10-3. Compared with ridge- regression based equalizer, better BER performance is obtained by SVR equalizing algorithm.

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