

Photonic Techniques for Generating a Single RF Sideband With No Second Order Sidebands

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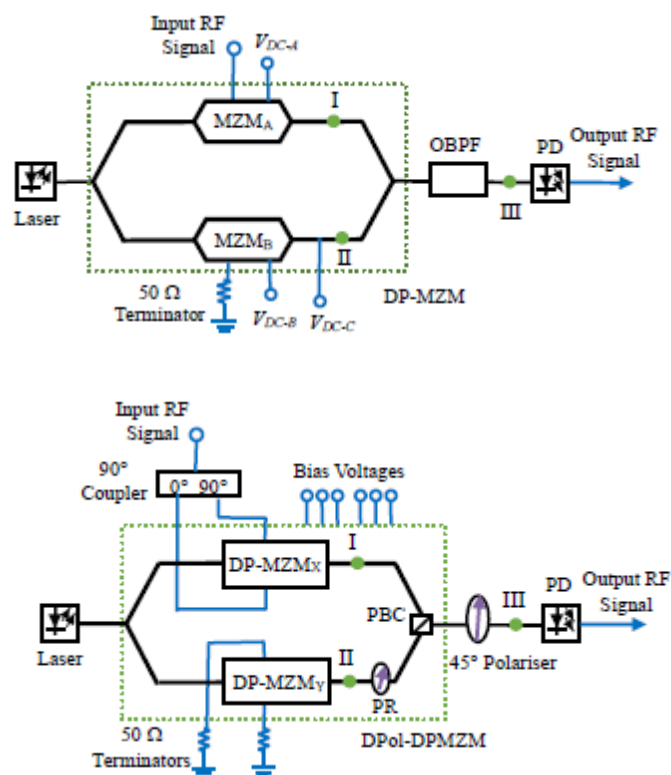
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Photonic Techniques for Generating a Single RF Sideband With No Second Order Sidebands

Two structures that can realise optical single sideband modulation without generating both second order upper and lower sidebands are presented. They are based on a dual-parallel Mach Zehnder modulator (DP-MZM) with an optical filter and a dual-polarisation dual-parallel Mach Zehnder modulator (DPol-DPMZM) with a 90° hybrid coupler. The former is an all-optical structure and hence it has a very wide bandwidth. The latter uses one DP-MZM to realise single sideband suppressed carrier modulation while the other DP-MZM simply passes the optical carrier. It also suppresses the third order sideband on the same side as the wanted fundamental RF modulation sideband. Hence, in an ideal situation, there is no second order harmonic component generated after photodetection. Experimental results are presented for the novel structures, which demonstrate the realisation of optical single sideband modulation without second order sidebands. The results also show large fundamental to second order harmonic power ratio over a wide input RF signal frequency range even after inserting a long single mode fibre into the system for signal transmission. The new optical single sideband modulators find applications in improving the multioctave spurious free dynamic range in a long-haul fibre optic link and reducing measurement errors in an optical vector analyser.



Structure of the DP-MZM and DPol-DPMZM based optical single sideband modulators.