Microwave Photonic I/Q Mixer With Phase Shifting Ability

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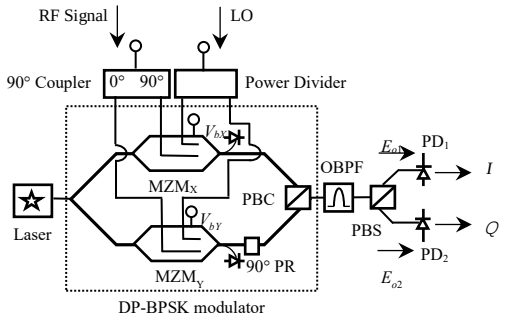
A compact system with multiple signal processing functions is of interest in many applications. The purpose of this paper is to present a microwave photonic structure that is capable of simultaneously realising in-phase/quadrature (I/Q) mixing and phase shifting operations. The multi-function signal processor has a simple structure and can be constructed using off-the-shelf components. It is designed to enable commercial modulator bias controllers to be incorporated into the system to provide accurate phase shift and to improve system stability. Non-ideal effects in the system that cause deviation in the two output IF signal phase difference from 90° can be mitigated by adjusting a modulator bias voltage. The multi-function signal processor is theoretically analysed and experimentally demonstrated. Its performance including two output IF signals with a quadrature phase difference, wideband operation, continuous 0° to 360° IF signal phase shift and long-term stable operation are verified experimentally.



Schematic diagram of the I/Q mixer with tunable phase.