INTRADYNE DETECTION DEVICE

Technological advantages

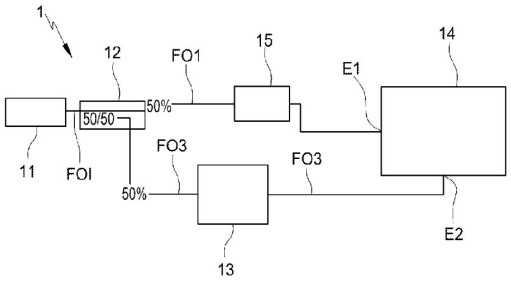
- Single laser source: native coherence between the telecommunications signal and the local oscillator.
- Elimination of complex servos: Removes the need for the complicated feedback control systems.
- Controlled frequency shift: An acousto-optic modulator applies a precise, predetermined frequency shift to generate the local oscillator.
- Residue reduction: Provides strict control over phase and frequency residues that typically disrupt detection.
- Penalty-free signal: Maintains an optimal signal-to-noise ratio at the receiver's output without inducing any measurable analog penalty.

Invention synthesis

This invention proposes an intradyne detection device designed to solve the instability problems inherent in traditional dual-laser systems. Instead of using separate sources, the device generates a single optical beam that is split into two equal parts by a coupler. The first beam carries the telecommunications signal (often via a QPSK modulator), while the second passes through an acousto-optic modulator that precisely shifts its frequency to serve as the local oscillator. Both waves are then fed into the intradyne receiver. This architecture is highly effective because it naturally cancels out relative drifts between the signals. As a result, it delivers a highly pure measurement with an excellent signal-to-noise ratio, streamlining metrology tasks without requiring cumbersome hardware feedback loops.

Potential applications

- Optical test benches: Integration into testing equipment to precisely evaluate optical links.
- Component evaluation: Accurate testing and calibration for optical modulators.
- Receiver calibration: Performance measurement and validation of intradyne detectors.
- High-precision metrology: Exact measurement of frequency gaps in optical research laboratories.
- Telecommunications networks: Enhancement of infrastructure systems with high phase stability.



Device schematic

11 : laser emitter
12 : coupler
13 : optical component
14 : intradyne receiver
FOI : initial optical beam
FO1 : first optical beam, FO2 : second optical beam, FO3 : third
E1 : first input, E2 : second input

Commercial benefits

- **Hardware cost reduction:** Replaces two lasers and their complex control systems with a single optical source and modulator.
- **Architectural simplification:** Creates a system that is easier for test equipment manufacturers to integrate and maintain.
- **Increased reliability:** The device is far less vulnerable to environmental variations (current, temperature) than dual-laser setups.
- **Faster certification:** Enables quicker and more reliable evaluation of optical components on production lines.
- **Competitive edge:** Provides measurement instrument manufacturers with a solution that guarantees zero analog penalty during testing.

Patented invention - under license.

For more information :

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