

Abstract Submitted
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Applications of complex modulation for reducing residual amplitude modulation and tuning sidebands¹ HANYU CHIA, DAVID TANNER, PAUL FULDA, JOHN CONKLIN, GUIDO MUELLER, University of Florida — Residual amplitude modulation (RAM) is a long-standing issue in optical phase modulation. RAM produces an undesired offset in control signals of optical cavities, such as the ones in Advanced LIGO. Here we present a study of “complex modulation” (CM) in which we simultaneously modulate the amplitude and the phase of a laser beam. CM provides a feasible approach to reduce concurrent RAMs. Two modulation techniques, single sideband (SSB) modulation and sideband-on-sideband suppression, were experimentally demonstrated by CM as the effective examples for sideband tuning. In order to characterize the electro-optic amplitude modulator (EOAM), a novel scheme to detect parasitic phase modulation (PPM) in an EOAM was built. At least an order of magnitude of RAM reduction and 20-dB suppression of higher-order sidebands were observed. For CM characterization, PPM was measured in real-time by the proposed detection scheme and consequently determined. The experimental results agreed well with CM’s core principle of generating designer sidebands.

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