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Applications of complex modulation[1] HANYU CHIA, ALEXANDER SCHINDLER-TYKA, SCOTT AARONSON, JOHN CONKLIN, PAUL FULDA, DAVID B. TANNER, University of Florida — Residual amplitude modulation (RAM) from a variety of sources is observed when using standard optical phase modulation. A consequence is undesired offset in optical cavity control signals, such as the optical cavities in Advanced LIGO. Here we present a study in which we simultaneously modulate the amplitude and the phase of a laser beam, an approach we call "complex modulation" (CM). CM provides a powerful method to reduce RAM. CM is also capable of generating designer modulation signals, such as single sideband (SSB) modulation and sideband-on-sideband suppression. All three applications of CM have been experimentally demonstrated. At least 10 dB of RAM reduction and 20 dB of second-order sideband suppression are observed. The experimental results were have been compared to detailed CM simulations.

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