

Abstract

Polarization Shift Keying (PolarSK) was initially proposed to send binary information over the phase of a vertical signal, horizontal signal, and the polarization of the signal pair [1]. This achieves a higher data rate than two Phase-Shift-Keyed channels alone, but comes with the penalty of lower amplitude and thus a higher bit-error-rate (BER). The focus of this project is to address an underlying weakness in the proposed scheme: the channel matrix, instrumental in the recovery algorithm, is assumed to be known a-priori. In real-world applications, a constant channel is not realistic as behavior changes with temperature, antenna orientation (instant or gradual), or other environmental variables. In this work, the channel matrix is adaptively estimated over time using Grassmannian-Rank-One-Update-Subspace-Estimation(GROUSE). This subspace tracking technique is observed to estimate the channel well from a training sequence, and is resistant to jump channel changes, gradual rotational changes (Givens and Phase angles), and gradual principal scaling changes.