DESIGN OF DIGITAL COMPENSATION FILTERS IN IQ MODULATOR BY H₂ NORM MINIMIZATION – A STATE-SPACE APPROACH

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ABSTRACT—In IQ modulators generating CPFSK signals, imperfections in the analogue reconstruction filters results in the loss of the constant envelope property of the output signal. Ripples in the envelope function cause spreading of the transmitted signal spectrum into adjacent channels when the signal passes through non-linear elements in the transmission path. This results in the failure to meet transmission standard requirements. In this paper, two time-domain techniques are proposed to compensate for the magnitude and phase characteristics of the two analog reconstruction filters. The techniques are based on the minimization of the H₂ norm of the error transfer function and are formulated using state-space equations. Simulation and implementation results are presented to illustrate the effectiveness of the new techniques.

Key Words: IQ Modulators, H₂ minimization, Digital compensation