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## z- Domain Analysis for Discrete Time 3rd Order Phase - Locked Loop

Abstract—A discrete time z –domain high frequency phase –locked loop model is presented in this paper. The z –domain transfer functions of the proposed system is derived by using impulse invariant technique to achieve an overall behavioral performance of the system. A second order active standard feedback approach filter is used in the loop to investigate the stability of the system. The stability margins in terms of phase margin, gain margin, overshoot, damping ratio are simulated by deriving the closed loop transfer function of the system in z –domain approach. The simulation results indicates that higher the value of phase margin enhance the stability of the system with no peak in the frequency response curve. Also, it is observed that lower the values of gamma represent that the system is unstable.

Index Terms—Damping ratio, gain margin, overshoot, phase margin, stability, transfer function

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