

ABSTRACT

The high train movement causes damages to the signal due to the Doppler effect making the Doppler Spread Compensator (DSC) technique plays an important role in the high speed railway technology. This thesis proposes the array antenna for DSC to compensate the Doppler effect to the received signal by using Interpolator based on Minimum Mean Square Error (MMSE).

This thesis designs a microstrip antenna of rectangular patch arranged in a linear way. The design of antennas is performed using software simulated with a computer. The material of substrate is FR4, while for ground plane and patch is copper. An outline is added to the design such that the array antenna does not affect to the aerodynamics of the rapid train. The antenna is connected to the DSC to reducing the Doppler effect to the received signals. The performance is evaluated in terms of Bit Error Rate (BER) against Signal to Noise power Ratio (SNR) and against the normalized Doppler spreads ($fdTs$).

The results of this thesis are: (i) the antenna has return loss $R_L \leq 10$ dB, Voltage Standing Wave Ratio (VSWR) of $V_{swr} \leq 2$, elliptical polarization, unidirectional radiation pattern, gain $G \geq 0$ dBi and (ii) a performance of the DSC to reduce the Doppler effect. Results of this thesis are expected to provide contribution to future Indonesia high speed railway systems.

Keywords: High Speed Railway, Array Antenna, Doppler Spread Compensator, Future Railway for Mobile Communication System (FRMCS).