CHAPTER V

CONCLUSION AND RECOMMENDATION

In this thesis, the spatial fading correlation characteristics in a multipath wireless communications are studied. Approximate equations for estimating the entries of transmit and receive correlation matrices for Rayleigh fading channel at the BS and MS antennas are presented. By means of this model, the effect of the correlation on the MIMO channel capacity is obtained.

The analytical expressions are derived for evaluating the channel ergodic capacities of an MIMO system in cases of the spatial correlation at the receiver side and uncorrelation at both the BS side and the MS side. The analytical results are shown to be accurate by comparison with simulation results. The results illustrate the performance degradation of channel ergodic capacity when operating in spatial correlated fading environments. The general closed-form expression in term of Meijer's *G*-function is proposed for simply evaluating the difficulty of the multidimensional integral form.

In this thesis, the distribution of the ordered eigenvalues of $\mathbf{S}=\mathbf{H}\mathbf{H}^{\dagger}\sim\widetilde{Q}_{N_{\mathrm{T}},N_{\mathrm{R}}}\left(0_{N_{\mathrm{T}}\times N_{\mathrm{R}}},N_{\mathrm{T}}\otimes N_{\mathrm{R}}\right)$ have not been considered for the full spatial correlation at both the transmitter and receiver sides in MIMO channels, However, the hypergeometric function of three matrix arguments is not practical for numerical work, and there is no formula for this function. It is the on-going work to derive closed-form expression to evaluate the capacity of the full correlated complex Wishart matrices by expanding ${}_0\widetilde{F}_0^{(N_{\mathrm{R}}),(N_{\mathrm{T}})}\left(\cdot,\cdot,\cdot\right)$ in complex zonal polynomials.

In the practical conditions, channel ergodic capacity of the MIMO system significantly suffers degradation at high SNR regions when CSI is not perfect at the receiver and under the impact of feedback delay. It is also the on-going work to derive expressions on BER of such system.