CHAPTER 7

CONCLUSION

In this thesis we present in details the modeling and simulation of high frequency RMSA models for mobile applications and discusses different aspects of design and development of the same on various substrates. A thorough design procedure gives physical insight to the fundamental characteristics of the antenna system by determining the overall performance through selectively controlling and evaluating contribution of various elements. The theoretical estimations of the proposed RMSA models are described in chapter 4 and are suitable for high frequency application in GHz range. The models are simulated in MATLAB platform to verify and compare the suitability and to study the various characteristics.

The conclusion of the proposed work can be summarized as given below:

i. The results of simulation for cavity and CAD models of the RMSA are in agreement with the values from earlier experimental works, while the results for transmission line model is limited to only rectangular configuration and all the parameters cannot be analyzed with proper precisions.

ii. The comparative study of simulated results show that the resonant frequency of cavity model is in close agreements with experimental results.

iii. The comparative study of simulated results also shows that the resonant radiation resistances of cavity and CAD models are in good agreements with experimental results.

iv. The simulated response of directivity and gain of transmission line, cavity and CAD model, shows that the cavity model provide better results than CAD and transmission line model.

v. From the simulated responses it is observed that BW of transmission line model gives better results for low dielectric constant and thick substrate.
While for high relative permittivity and thin substrate it yields minimum BW. On the other hand the BW variation of cavity and CAD model are more reliable. Because in the computation of cavity Q factor, all the losses are taken into account while the transmission line Q factor is based on RLC circuit configuration.

vi. From the tolerance analysis it is observed that the radiation resistance, directivity and BW of transmission line model are almost insensitive to tolerance in patch dimensions.

vii. The comparative study of simulated responses of all the three RMSA models in frequency and space domain reveals that the cavity model and CAD model performs better. Especially, the CAD model behaves like real time situation and is consistent in predicting the basic RMSA characteristics. But it provides almost no physical insight into the dynamic behaviors of the real antenna.

The results of our theoretical models of RMSA for mobile applications will certainly provide patch antenna designers, engineers and developers in research and industrial application to develop their own antenna, with circumstantial tradeoffs, where necessary, with the present topologies.

As part of our future work, we propose to design and fabricate the hardware of the present RMSA models. In addition, since the present models of RMSA can only operate in single frequency band and are linearly polarized, we proposed to modify the models, so that it can operate for dual or multiband operation with circular polarization.