

Chapter 5

Conclusion and Future Work

5.1 Conclusion

SiGe HBTs are getting more and more important in current commercial market especially for the RF applications. In this thesis, the substrate parameters extracted is taken account of intrinsic element which is indeed strong influence of substrate impedance. The intrinsic feedback circuit element exist the value of Y_3 which causes the error between $Y_{22}+Y_{21}$ and Y_{sub} . The intrinsic parameters can be also present by simplify formulas and accurate results. It is helpful to be used by direct extraction method. Besides we have investigated the bias dependence of intrinsic parameters variation. The non-ideal effects include Kirk effect, self-heating effect and current crowding effect which affect the value of intrinsic parameters seriously. On the other hand, the geometry issues for small-signal model parameter-extraction has present including emitter length scaling, emitter width scaling, emitter multi-finger number, multi-cell number and different layouts for collector and substrate construction. From above measurement and modeling results, the geometry effects actually influence devices' current gain and f_{max} with increasing g_m and reducing R_b respectively. Finally, the geometry effect of different layouts for collector and substrate has discussed. It is clear that the layout configuration has a strongly influence on the R_{bk} and C_{sub} in chapter 5. It can be predicted the output impedance and S_{22} characteristics change with layouts of collector and substrate.

5.2 Future Work

As the SiGe HBT is popular in recent years, more and more researches are made for improving the performance and getting more widely used. The more accurate small signal model is desired for a circuit designer, not only in the RF application but also in the low-frequency region. In the future, we can develop the large signal model and noise model according to the small signal model in this thesis further.

