CHAPTER 5

SUMMARY AND FUTURE WORK

5.1 SUMMARY

The present research consists of

(i) Derivation of both Zakharov and Hasselmann equation following the works of Stiassnie and Shemer (1984) and Rasmussen (1995). Some details are also included besides the derivation of the closure hypotheses.

(ii) A Polar method for obtaining wave resonating quadruplets in deep and finite depth waters.

(iii) A Quadrature method for computing the nonlinear source term using the above polar method.

Unlike the radial method of Tracy and Resio (1982) and Van Vledder (2000), in which, the number of points on the locus are fixed irrespective of the choice of the input wave vectors, the number of points on the locus using our polar method varies. This choice of polar method may have computational advantages. But in order to apply this method to the nonlinear problem, we need to employ different input polar grids. This has been achieved with the use of the properties of the delta function so that quadrature methods can be used whose convergence can be verified.
An accurate method using Composite Gauss-Legendre N point quadrature formula was presented in Chapter 4 for solving the nonlinear wave-wave interaction source term in deep waters. This method employs a polar grid in the wavenumber space with a constant geometric ratio $\lambda$ and uses the scaling relation for the transfer integral. The accuracy of the method has been tested for different $\lambda$ by increasing N. This increase in the value of $\lambda$ has helped in calculating the nonlinear source term at less number of frequency points, resulting in reduced computation time. We also included the procedure for obtaining the nonlinear results at more number of frequency points.

A comparison study of 1-D nonlinear source term $S_{nn}(f)$ with results of exact methods, indicates that the present results are comparable and qualitatively in good agreement with WRT method. Small differences at higher frequencies may be due to different polar grids employed for the input vectors in the present method, whereas, there they are same in WRT method. The present method thus could model the nonlinear problem using quadrature methods by considering different input polar grids and hence can be studied by varying all the integration direction parameters.

5.2 FUTURE WORK

Having modelled the nonlinear problem using quadrature method, future work can be aimed at:

- improving this method and reducing the computation time further.
- application to finite depths.
- considering other quadrature methods.
- applying this polar method in WRT method for different choices of input polar grids.