CHAPTER VI

CONCLUSIONS

Electron distribution in heavier atom has charm for study and they are connected to calculation of binding energy of heavier atoms. At ground state,theelectron distribution form is independent of timeand can somehow be proposed by Thomas-Fermi model.

In this thesis, we use Modified Adomian Decomposition Method (MADM) to solvethe dimensionless Thomas-Fermi equation $y''(x)=\frac{y^{3/2}(x)}{x^{1/2}}$ .The process generates crucial parameter namely "Adomian polynomials; A_n" via Order-By-Order Extraction Technique (OBOET). Adomian polynomials; A_n extrapolated to infinite series form the solution of Thomas-Fermi equation, $y(x)$ by MADM. It is representedin terms of potential between electron and nucleus. In fact, we have unknown initial slope $B = y'(0)$ and we initially cannot generate solution to infinite series. Thus, we incorporate a technique called Padé approximants .This method makes the modified solution to converge. One benefit of Padé approximants is that it enables us to calculate the initial slope, $B \equiv y'(0)$.

Finally, we get high accuracy result of Thomas-Fermi model via MADM incorporated with Padé approximants. We compareThomas-Fermi equation solution by the Differential Analyzer [1] and electron distribution function of mercury with electron distribution function of mercury solution [3]. In the section of Padé approximants, the solution of order [10/10] yields the initial slope $B = y'(0) = -1.588069657$. It has an error of 8.45×10^{-5} % compared with the initial slope obtained by Kobayashi [7].

We could build a new algorithm to generate Adomian polynomials; A_n for Thomas-Fermi equation or any nonlinear ordinary differential equations using "Order-By-Order Extraction Technique (OBOET)".