

# **Final Report of Computation Team**

(Numerical Analysis and Word Processing)

Computation team  
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## **1. Numerical Analysis**

1). The Purpose of Numerical Analysis The numerical analysis using the computer makes easy to solve the complex problems in Physics. In this summer computation seminar, we studied the basic concepts for the numerical analysis and the elementary way to analyze the problem to solve the numerical analysis.

### 2). The Contents

We studied to find the root of equations. By using Gauss elimination, we were able to solve the linear equations. And root of nonlinear equations was able to obtain through the Bisection method, Muller method and Newton method. Through the Newton method and Gauss elimination, we was able to solve the nonlinear equation with n unknown.

## **2. Word Processing**

### 1). The Purpose of Word Processing

Recently, the presentation and publication by using the computer are most common way to make a document. In this summer computational seminar, we studied the usages of the computer software for typesetting document.

### 2). The Contents

We studied usage, user-defined, graphics about Ms word, Powerpoint and TeX.

## **3. Development of User Interface**

User interface is the most important component to develop the computational package for the nonlinear dynamics and chaos. Basic component of the user interface consists of menu, toolbar, and dialog box. In this summer seminar, we develop the basic user interface by using GTK library.

GTK library is the most popular graphic library, and it is used in Linux system originally. Recently, it supports the Microsoft Windows environment. By using GTK library, we compose a basic program in

concept of the graphic user interface. First, we develop the menu system. Through the menu system, one can do his job. Second, the toolbar corresponding the process of the menu system is developed. Finally, some dialog boxes are developed to set variables for the computational program. To test the user interface using the GTK library, we compose the program to plot the bifurcation diagram in the 1D map. For the future work, we may study some programming tools (e.g. Dev-C++ IDE: Integrated development environment for the GTK library, Glade: Graphical tools to design the user interface for the GTK library) those make easy to develop the graphic user interface package. Then, we extend our user interface to more complicated one and higher dimensional problem.