Application of MATLAB in Chemical Engineering Experiment Data Processing

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Abstract: In the context of the continuous strengthening of China's comprehensive national strength, a large number of technical personnel have been trained, and various new technologies have also been developed rapidly. In the past, people engaged in chemical engineering not only need to do chemical experiments with high difficulty and danger, but also deal with complex experimental data, which not only aggravated the burden of researchers, but also wasted time and resources. So the study of Chemical Technology in China need to continue to reform and innovation, MATLAB is an innovative and efficient software, can handle a variety of complex data, thereby greatly reducing the workload of the researchers, now in various experiments of chemical engineering has been widely used. This paper will analyze and study the important role of MATLAB in the data processing part of chemical experiment.

Keywords: MATLAB; data processing; innovative software; chemical engineering.

Chemical engineering is a very important basic discipline. It plays an important role in promoting the development of science and technology and the progress of the times. Among them, chemical experiments occupy a very important role in chemical engineering. The results of experiments have made progress in chemical engineering. Critical impact, and a major component of chemical experiments is data processing. Only the reasonable and effective treatment of the experimental data can lead to the correct experimental conclusion[1]. However, in the past, chemical research personnel used to process data in China. This method wastes human resources and working hours, and often has certain errors. In this context, chemical engineering researchers urgently need to develop new data processing methods. The successful development of MATLAB has greatly promoted the development of chemical engineering. It has made the calculation steps simple and simplified, and also made the accuracy of experimental data processing higher and greatly improved the work efficiency..

Mathworks of the United States first developed MATLAB software, and its computing environment was designed primarily for visualization, interactive programming, and scientific computing[2]. In MATLAB's simple window environment, it has very powerful functions and can perform various data processing, such as simulation, numerical analysis, matrix calculation, system modeling, scientific data visualization, etc., providing many scientific fields that need to calculate effective values. A perfect solution[3]. To a certain extent, it reflects the advanced level of scientific computing software in the world today. In recent years, MATLAB has been used more and more widely in the data processing of chemical engineering experiments, which has greatly improved the efficiency of data processing by researchers.

1. Experimental data processing in chemical engineering

Chemical experiments occupy a very important position in chemical engineering and are important methods for researchers to carry out chemical analysis. The synthesis of new substances and the production of new results are inseparable from chemical experiments. What is different from experiments in other disciplines is that chemical
experiments focus on whether the experimental results can solve related chemical problems or explain certain chemical phenomena. The results of chemical experiments can not only solve some chemical problems, promote the development of the chemical industry, but also have a great impact on human daily life[5]. It can be seen from this that it is quite important to carry out chemical experiments in chemical engineering. However, in the past, the large amount of data recorded in chemical experiments can only be manually processed by the experimenter, and the data is often very complicated and complicated, which brings more difficulties to the process. Moreover, the process of completing the experiment also takes a lot of time. At present, this kind of experimental method can't keep up with the rhythm of the times, and it is difficult to meet the needs of rapid social development. However, with the rapid development of a variety of science and technology represented by computers, human-made computers have a relatively complete method of processing data, which can completely replace manual processing methods, making chemical experiments easier and more convenient, and people no longer need to carry out cumbersome Data processing makes the experiment efficiency greatly improved[6].

Chemical experiments are inseparable from data processing. Its implementation is often obtained by a large amount of data processing. Only when reasonable and effective data processing is performed can accurate experimental results be obtained. However, data processing is very difficult and must be calculated to process large amounts of data. If you use manual calculations, it will not only waste time but also the energy of the researchers. An effective way to solve this problem is to use a computer to process the experimental data[7].

Chemical experiments are very important in chemical engineering. They are an important part of chemical engineering and technology. They often encounter some difficult chemical problems in their lives. At this time, they need to conduct reasonable experiments and get effective according to them. Experiment with data to find answers or efficient solutions. However, the actual experimental operation is subject to many factors. Therefore, the experimenter should perform appropriate data processing for the limiting factors, so as to obtain accurate data in accordance with the experimental phenomenon, thereby solving the corresponding chemical problem[8].

Chemists can design different chemical experimental methods for verification studies based on various life phenomena. The difficulty of implementing different experimental methods is also different. It is certain that the implementation process of most chemical experiments is difficult. There is often an intrinsic link between the various data of chemistry. However, this kind of connection cannot be directly seen, but it takes a lot of in-depth research and complicated calculations to get further conclusions. The data processing process of the experiment often requires a lot of energy from the researcher, and it is more difficult to analyze some complicated and difficult data. At this time, if the computer is used in the experiment, the computer integrates the data, removes the invalid interference data, and only leaves useful data for the next data processing, which not only saves the time for processing the experimental data, but also improves the results. Accuracy.

2. Application analysis of MATLAB in chemical engineering experimental data processing

In chemical engineering, it is often necessary to use MATLAB, an advanced software that can replace manual chemical calculations with high-tech technology. The data obtained are very reliable and effective, and then analyze specific chemical phenomena to find a Reasonable explanation[10]. In addition, the software is capable of writing programs and running data results. In summary, the advantages of this software are numerous, its main advantage is that the operation is simple and easy to understand, easy to learn and use. Its operation interface is designed to be very user-friendly, which not only simplifies the calculation process, saves computation time, but also greatly improves the accuracy of calculation results and helps to reduce the error[12].

MATLAB software has a wide range of applications and functions. It is not only easy to write programs, but also easy to maintain designed programs. It also has an operating system with many platforms. This software has a great influence on the experiment of chemical engineering. It can write chemical experiment phenomena into programs using
a simple programming language. And played a pivotal role in the processing of experimental data\(^{[13]}\). It must be said that this is an important breakthrough in chemical engineering and technology, leading the direction of the discipline of chemistry. The specific data processing framework is shown in Figure 1.

![Figure 1. data processing framework diagram](image)

(1) Drawing a program diagram

For different chemical experiments, their data processing procedures and program maps are often different. Correspondingly, the formulas used in different program diagrams are also different. The above various factors have played a decisive role in the difficulty of the experiment. Role\(^{[15]}\). An experiment often has only one special procedure that can be used to describe the experiment. However, all experiments have similarities.

### 2.1 Writing a program

#### 2.1.1 Input data

INPUT is the most used input program. It passes the experimentally valid data into the specific program of MATLAB, and the software processes the data to obtain reasonable and correct conclusions. Next, the input temperature data is taken as an example. The system requires the program to input the temperature. Its implementation form is generally: \( t = \text{input} \). It should be noted that the data of the input program is often in the form of a group, and only the program processing system is effective and feasible. Such a system has a faster processing speed and excellent processing results.

#### 2.1.2 Processing data

For the general case, before processing the experimental data, the obtained data should be analyzed and analyzed until the program model can be transformed into a continuous curve. The specific integration method is different due to the characteristics of the program itself. Among them, the least squares method is a relatively common integration method, and it is specifically analyzed here\(^{[16]}\).

How to integrate the data \( x \) and \( y \) using the least squares method? The value of the square of the residual \( 2 \) on the fixed value \( x \) should be minimized, and the functional relationship \( y = f(x) \) between \( x \) and \( y \) is obtained. When people test the data, it is difficult to avoid errors. The least squares method does not need all the \( x \) and \( y \) data on the function \( y = f(x) \) as long as the sum of the squares of the residuals is satisfied. This also shows that the least squares method is very suitable for data integration, which is also the data processing method derived from MATLAB software.

#### 2.1.3 Establish a database

The data is often analyzed under special conditions. In people's daily life, the conclusions drawn are always biased compared with the experimental data, rather than being completely consistent. In this case, the technical workers need to be different. The data is integrated and the corresponding relationship is derived, which is the process of establishing the database \(^{[8]}\). After that, as long as a certain amount of data is input, the specific program will quickly analyze and calculate the data, and finally obtain the output value of the input data.

### 3. Conclusion

The use of MATLAB software in the data processing of chemical engineering experiments is an important breakthrough in chemical engineering in China. This software can automatically analyze and organize complex and difficult data, and program correct and effective data. The results obtained by using this method are more
accurate than before, and greatly save resources such as time and labor. It can be seen that MATLAB software plays a vital role in the construction of chemical engineering and technology.

References