which have accessible control, can be controlled by buttons on screen. Technological flow chart is shown in figure 9.

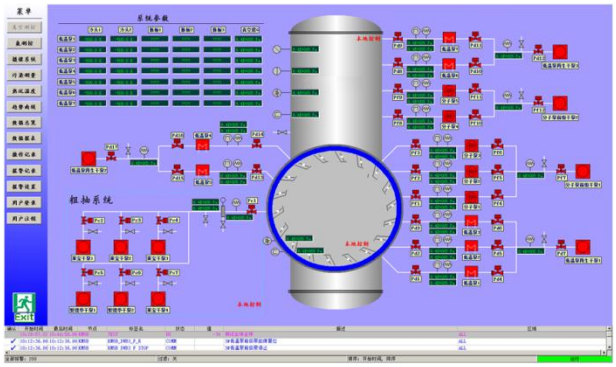

Figure 9. Technological flow chart

(2) Curve display：All the collected real-time date is displayed in the form of curve. Multiple curves can be displayed simultaneously or separately, and history curves can be queried. The schematic of curve display is shown in figure 10.

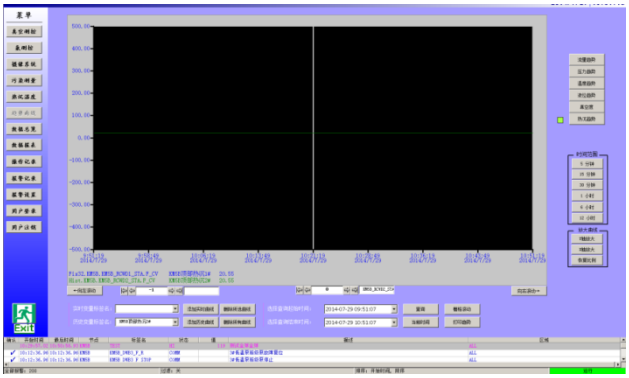

Figure 10. The schematic of curve display

(3) Date query：Establishing an independent data query can query the historical operating state and the historical date of the system, including operation logs and key historical date. The schematic of data query is shown in figure 11.

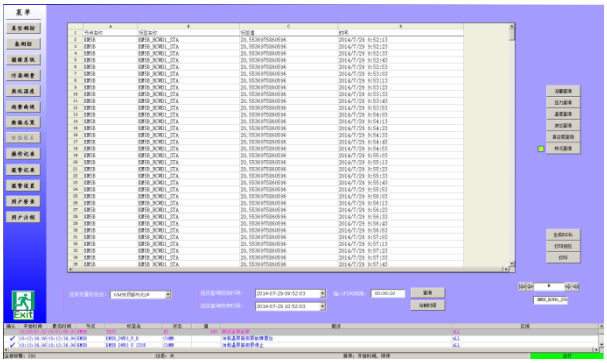

Figure 11. The schematic of data query

(4) Alarm information：Alarm information of the control system include the real-time alarm information and historical alarm information. The current real-time alarm can be manually processed. The schematic of Alarm information is shown in figure 12.

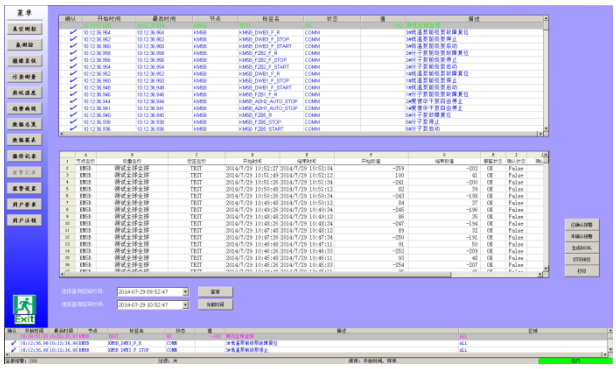

Figure 12. The schematic of alarm information

5 Conclusion

This paper introduces a large-scale near space plasma vacuum environment imitation technique. Through calculation and analysis, this paper provides a design scheme required for vacuum working environment. The negative pressure vessel system, vacuum subsystem, vacuum system is introduced in detail.

The finite element analysis and numerical calculation of the mechanical structure and the vacuum capacity verify the feasibility of the design. The indicators of the system proposed in this paper are qualified. It can effectively reduce the influence of wall effect in the research of space plasma.

References

1. K. Kuriki, H. Kuninaka,. Numerical analysis of interaction of a high-Voltage solar array with ionospheric plasma. *J Spacecr. Rockets*, **24(6)**:512-517(2015)
2. M. Cho, D.E. Hastings. Dielectric Charging Processes and Arcing Rates of high Voltage Solar Array, *J Spacecr. Rockets*, **28(28)**:698-706(1991)
3. H. Thiemann, R.W. Schunk. Computer experiments on arcing processes as observed in ground tests. *J Spacecr. Rockets*,**31(31)**:929-936(2015)
4. H. Thiemann, K. Bogus. High-Voltage solar cell modules in simulated low-earth-orbit plasma. *J Spacecr. Rockets*, **25(4)**:278-285(2015)
5. Upschule B L et al. Arcing of Negatively Biased Solar Cells in Low Earth Orbit. AIAA 92-0578
6. M.R. Carruth et al. Experimental Studies on Spacecraft Arcing. *J Spacecr. Rockets*,**30(3)**:323-327(2015)
7. D.E. Hastings, M. Cho, H. Kuninaka. Arcing rates for high voltage solar arrays: theory, experiment and predictions. *J Spacecr. Rockets*, **29(4)**:538-554(1992)
8. Quin S, Windra G E O. Use of Stress-Strengh Model in Determination of Safety Factor Pressure Vessel Design[J]. *Journal of Pressure Vessel Technology*, **118(1)**:27-32(1996)
9. I. Elishakoff. Essay on Uncertainties in Elastic and Viscoelastic Structures: From A. M. Freudenthal's Crutucusms to Modern Convex Modeling[J]. *Computers & Strultures*, **56(6)**:871-895(1995)
10. Y.M. Zhang, Q.L. Liu. Reliability-Based Design of Automobile Components[J]. Proceedings of the Institution

of Mechanical Engineers Part D, *Journal of Automobile Engineering*, **216(6)**:455-471(2002)
11. B. Huang. Space environment test facility for manned spacecraft[J]. *CSST*, **22(3)**: 1-3(2002)
12. Lee Jin,N.S. Harris,N. Tenwick, et a1. Modern vacuum practice[M]. 3rdedition. BOC Edwards. 201-266(2000)
13. J. Tong,L. Sun,R. Jia,Y. Liu, et al . Experimental Techniques in Simulated Space Plasma Environment on Ground [J]. *Chinese Journal of Vacuum Science and Technology*, **28(3)**:203-207(2008)
14. M. Ma,T. Chen,J. Lei, et al. Design of Large-Sized Space Plasma Simulation System for Low Earth Orbit Environment[J]. *Chinese Journal of Vacuum Science and Technology*, **36(6)**:680-685(2006)
15. Cho M, Shiraishi K. Laboratory Experiments on Mitigation a-gainst Arcing on High Voltage Solar Array in Simulated LEO Plasma Environment. AIAA2002-0629
16. Tribble A C. Low Earth Orbit Plasma Effect on Spacecraft, A-IAA93-0614
17. Hastings D E. A review of plasma interactions with spaceraft in low earth orbit. *J. Geophys. Res*, **100(A8)**:14457-14483(1995)