



Research on Simulation Experimental Platform under New Power System

Li Qingsheng^{a,1}, Long Jiahuan^a, Li Zhen^a, Yang Shunji^a, Xu Ying^b

a. Guizhou Power Grid Co., Ltd, Power Grid Planning Research Center, Guiyang, 550000, China

b. College of Electrical Engineering, GuiZhou University, Guiyang, 550025, China

1. Introduction

Following the proposal of national energy strategy with the goal of "Carbon Peak and Carbon Neutrality", the energy transition has been continuously intensified to gradually form a situation that a large number of new energy sources are connected to the power system [1]. The new power system will become the definite frontier field of electric science for a very long time. The traditional power system has centralized power supply, large unit inertia, high transmission voltage grade, accurate and controllable power generation system, and basically measurable power consumption system, which is easy to realize the safe and reliable operation of the power system. However, the new power system is dominated by distributed and centralized new energy. The power generation system becomes uncontrollable due to the access of a large number of new energy sources, and the accuracy of user load prediction decreases, which seriously affects the stability of the power system [2]. At the same time, the new power system shows a trend of high integration of technologies such as electric, automation and communication in the field of technology [3]. As a result, it is inevitable to cause a profound change in the field of traditional power system technology for the construction of a new power system with new energy as the main body, which objectively requires that the discipline of power system must make great adjustments, and the corresponding teaching and scientific research activities and talent training methods must also adapt to the new requirements.



Abstract.

According to the development trend of electric frontier field and the requirement for construction of new engineering, the construction and application of simulation experimental platform under new electric system are studied. The construction scheme of new engineering experimental platform of electric system, which takes the real-time simulator of electric information as the core, is put forward to connect all links of demand analysis, system design, mirror simulation and product definition, train and cultivate the students' ability of project development, and organize the fragmented knowledge of multiple courses.

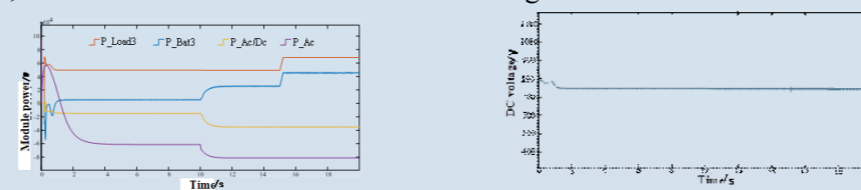
Keywords: New power system, real-time simulation, smart grid, experimental platform1

2. Proposal of New Electric Engineering

The technical elements, production mode and business form of power industry will change a lot with the advancement of new power system, and even the entire industrial chain will be fractured and reorganized. In the future, more emphasis will be placed on the whole knowledge, overall quality and innovative practical ability of practitioners in the electric field, and more attention will be paid to power electronics, information technology and new energy technology. However, a fixed mode of professional talent training has been formed in decades of stable system and technology paradigm in the electric power industry [4]. The existing curriculum system and practice links have been unable to meet the needs of the industry, and the problem of contradiction between talent training in colleges and universities and national strategic needs is prominent. In this context, the new engineering concept and its connotation timely put forward by the Ministry of Education have provided a clear way to solve the contradiction between teaching and industry. For the new electric engineering, it is the response and implementation of the connotation of new engineering to carry out the reform of teaching and practice in the face of the technical system and development trend of new electric power system.

3. Construction Scheme of Experimental Platform

The technical frontier of new power system is manifested in grid connection of new energy power generation, smart micro grid, flexible distribution network and other fields. The overall architecture design of the experimental platform is closely towards the trend hot spots to design digital research objects, based on which to design experimental projects and teaching cases. The experimental platform includes a host computer, a real-time simulator of electric information (UREP300), an actual industrial unit, and a programmable industrial unit, etc. The overall architecture is shown in Figure 1.



4. Application of Experimental Platform

The connotation of new engineering emphasizes practical ability, which is cultivated comprehensively rather than partially and is related logically and not fragmented. Centering on the connotation of new engineering and combining with the industrial demand and technical development direction of new power system, the platform creates a new engineering experimental model.

In terms of industrial demand, the fields in power supply operation and maintenance, power grid operation and maintenance, electrical manufacturing and experimental R&D of new power system have imposed new requirements on the talents of new engineering. Therefore, experimental teaching is necessary to cover the courses such as New Energy Power Generation Technology, Smart Power Distribution Network, Smart Micro Grid and Power Electronic Technology, so as to cultivate the students' practical ability and innovative ability in the field of new electric technology and satisfy the talent needs of the actual industry through real-time simulation, hybrid simulation experiments and comprehensive innovative practice. In terms of technical frontier, the construction of new power system covers the technical frontiers in the fields of interdisciplinary knowledge, information and communication technology, embedded development and application.

5. Conclusion

The simulation experimental platform under new power system proposed in this paper comprehensively uses real-time simulation, rapid control prototyping, hardware-in-the-loop and other means to develop lean project cases, which are used for experiencing the innovative practice teaching in the whole process. The experimental platform highlights the overall support for new power system in the arrangement of project content, and reflects the requirements of the new engineering connotation for innovative practical teaching in the design of experimental mode.