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Research on the Impact of Advanced Rule Design System on the Digitization of Reactor Building Model

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This paper proposes a more stringent method for customizing project rules. This method customizes the comprehensive rules of the project and component reference database on the digital plant design platform based on some general design codes, standards and item classification principles in nuclear engineering, digitalization requirements in reactor design, plant layout, project management, material procurement and construction, etc. In order to improve the correlation between design specifications and digital power plants, enhance the data consistency among different design disciplines, standardize the three-dimensional layout design of nuclear power plants, ensure the consistency between the digital power plant model and the real power plant, the rules are sorted out, analyzed and transformed systematically in this paper. These rules include the naming and classification principles of items in nuclear power projects, model data composition structure, essential attribute content, component selection filters, material performance, model parameters, output content format, basic requirements for plant layout for reactor design, etc. Through refinement and improvement, this paper finally forms a systematic rule customization scheme, which includes parameters such as process, operating conditions, materials, fluids, specifications, safety, quality assurance, seismic and radioactivity levels, as well as items naming rules, project database, component reference database, three-dimensional modeling, information integration, attribute inheritance, data extraction and other rules. This scheme can make the three-dimensional arrangement more standard, the operation steps more concise, and greatly reduce the attribute range of manual input by the designer. It can effectively promote the accurate and appropriate expression of process and instrumentation process design scheme in the reactor building model. Significantly shorten the project design cycle. Data integration and transmission between rules enable system attributes to be deeply inherited and automatic checking and judging of operating conditions parameters and pressure and temperature limits in physical properties of component materials. This scheme can make the three-dimensional layout more standard, the operation steps more concise, greatly reduce the attributes range of manual input by the designer, and obtain better application feedback in automatic drawing and material report. These rules provide more comprehensive data support for coupling experiments, data integration, process simulation and digital handover of different disciplines and depths.

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China

Authors: WANG, Jin; Prof. YANG, Hongyi

Presenters: WANG, Jin; Prof. YANG, Hongyi

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