

CODIS: AN INTEGRATED CONTROL AND OPERATION SYSTEM FOR HL-3

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CODIS (Control Operation Data Intelligent System) has been developed for the control and operation of HL-3 and other nuclear fusion experimental devices. Its purpose is to integrate all people and all subsystems involved in the fusion experimental device into a unified system. The entire system is divided into three layers, namely the personnel function interface layer, the CODIS Core layer, and the system function integration layer. Between these three layers are enterprise standards and docking operations with CODIS Core.

The personnel function integration layer is mainly based on WEB technology with cross-platform capabilities and a series of API interfaces provided to third parties to realize the interaction between participants in the fusion experiment, who is responsible for operation, commissioning, simulation, data analysis, management, delivery, integration, security, quality, maintenance etc., and CODIS Core.

CODIS Core is mainly composed of a series of services, frameworks and platforms written in Java that run on a virtual machine cluster, including full-stack security, intelligent platform, IoT platform, edge cloud network infrastructure, data access analysis and display, control/operation/monitoring business, personal and equipment security, device operation quality, workflow and more.

System function integration layer includes a universal physical fusion devices operating framework that abstracts the control operation characteristics of various types of physical fusion devices, a universal numerical fusion device operation framework that abstracts the operation characteristics of various simulation codes, and a universal digital twins operating framework based on the operation behavior characteristics of physical devices and numerical devices. It also includes MINI-CODIS, which is designed to provide commissioning platform for third parties to develop the contractual subsystem outside the fusion device.

CODIS is already operational on HL-3 and some other fusion devices in China.

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