

Enhanced Computational Infrastructure for Data Analysis at the DIII-D National Fusion Facility*

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The newly formed Data Analysis Applications Group has begun implementing a long term plan to enhance data analysis capabilities at the DIII-D National Fusion Facility. The plan includes both hardware and software enhancements to increase data analysis throughput and data retrieval rates. Hardware enhancements include a 3 TB mass storage system for raw shot data composed of hard disks, a magneto-optical jukebox, and a DLT jukebox. This system provides data access 24 hours a day, 7 days a week. Increased Unix workstation CPU power is being efficiently utilized via the load balancing software LSF Suite by Platform Computing. These workstations are being placed on the scientist's desktop giving rapid console response as well as load balancing via a new 100 Mb/sec intranet. User files are shared in the Unix cluster using a Network Appliance F520 network data storage system with a capacity of 100 GB, a factor of three increase over previous storage capabilities.

Software enhancements are focusing on streamlined analysis, automation, and GUI systems to enlarge the user base. Streamlined analysis has been aided by the adoption of the MDSplus system to provide a unified interface to analyzed DIII-D data. The amount of data stored in the MDSplus system continues to increase currently totaling 25 GB for 3800 shots. The majority of MDSplus data is made available in between pulses giving the researcher critical information before setting up the next pulse. Work on data viewing and analysis tools focusses on efficient graphical user interface (GUI) design with object oriented programming (OOP) for maximum code flexibility. The majority of our tools are written in IDL, a commercial software package for scientific data manipulation and visualization. A new object oriented graphics package, GaPlotObj, has been layered on top of IDL direct graphics to provide a standardized user interface with great flexibility in viewing and analyzing scientific data. Two codes utilizing this graphics package are EFITtools and ReviewPlus. The former is a suite of tools that allows for viewing results from the equilibrium reconstruction code EFIT, for running EFIT interactively, and for running a kinetic EFIT that includes a full pressure profile as input data. ReviewPlus is a GUI based tool for viewing plasma data that allows users to interact with time histories, profiles, contour and surface plots on the same window, and quickly perform mathematical manipulations or combinations of data from different diagnostics.

Work to enhance the computational infrastructure at DIII-D has included a significant effort to aid the remote collaborator since the DIII-D National Team consists of scientists drawn from 9 national laboratories, 19 foreign laboratories, 16 universities, and 5 industrial partnerships. This work can be summarized in that DIII-D data is available on a 24×7 basis from a set of viewing and analysis tools that can be run either on the collaborators' or DIII-D's computer systems. Additionally, a Web based data and code documentation system has been created to aid the novice and expert user alike. Details of the Group's progress and long term plans will be presented as well as a live demonstration of our analysis software.

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