The Between-Pulse Data Analysis Infrastructure at the DIII-D National Fusion Facility

D.P. Schissel, G. Abla, S. Flanagan, L. Kim, and X. Lee

General Atomics, P.O. Box 85608, San Diego, California 92186-5608, USA

Abstract

The DIII-D National Fusion Facility is a national and international collaboration among ~ 100 institutions with an overall goal of establishing the scientific basis for the optimization of the tokamak approach to fusion energy. A key enabler of the DIII-D mission is its extensive diagnostic set (>50) that measures relevant equilibrium parameters as well as turbulence fields. The ability to access, analyze, visualize, and assimilate data between DIII-D pulses that enables real-time decision making by an international team is a critical infrastructure component of the successful operation of the DIII-D facility. This paper examines the computer science issues associated with deploying this infrastructure in a geographically distributed environment where near-real-time support of control room decision-making is required. The implication of this work on the operation of future experimental machines such as ITER is also presented.