

AUTOMATED CALCULATION OF DIII-D NEUTRAL BEAM AVAILABILITY*

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The neutral beam heating systems for the DIII-D tokamak are an extremely reliable source of auxiliary plasma heating, routinely supplying up to 20 MW of injected power, with eight separate beam sources. The availability of these systems for tokamak operations is sustained by careful monitoring of performance. One of the metrics for this performance is the requested injected power profile as compared to the power profile delivered for a particular pulse. This was a relatively straightforward task, however innovations such as the ability to modulate the beams and more recently the ability to substitute an idle beam for one which has failed during a plasma discharge, have made the task very complex. For example, with this latest advance it is possible for one or more beams to have failed, yet the delivered power profile may appear perfect. Availability used to be manually calculated, this paper presents the methods and algorithms used to produce a system which performs the calculations based on information concerning the neutral beam and plasma current waveforms, along with post-discharge information from the Plasma Control System, which has the ability to issue commands for beams in real time. Plots representing both the requested and actual power profiles, along with statistics, are automatically displayed and updated each shot, on a web-based interface viewable both at DIII-D and by our remote collaborators using no-cost software.

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