

PERFORMANCE OF A DIII-D NEUTRAL BEAM ION SOURCE WITH A NEW ACCELERATOR GRID*

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The DIII-D tokamak utilizes seven neutral beam ion sources for plasma heating and current drive. These ion sources have performed with high availability and reliability since 1987. However, components of the ion sources, especially the grids of the accelerator, have since developed hardware failures either due to old age or fabrication defects. Repairs were hampered when the original ion source manufacturer declined to fabricate spare parts, and internal efforts failed in attempts to manufacture the diamond-shaped molybdenum tubes needed for the plasma grid. To solve this dilemma plasma grids with circular cross section molybdenum tubes were built and installed in one of the ion sources. Tests were performed on this ion source (we will call it the new ion source) and results were compared with one of the original ion sources. The new ion source runs just as reliable as the original ion sources, though the operation window is slightly smaller and the value of the optimum beam perveance is about 4% less (4% less beam current). This new ion source has been used to inject neutral beams into plasmas of the DIII-D tokamak to support physics experiments. No operational problems or difficulties were encountered during more than 5 weeks of operation. Details of the new plasma grid and the operational results will be presented.

Topical Category: 10) Heating and current drive

Preference: Poster

Paper Placement: Please place this paper with companion paper: "Development and Fabrication of New Accelerator Grid Modules for Ion Sources in the 80 keV Neutral Beam Lines for DIII-D," by H.J. Grunloh, M.G. Madruga, J.L. Busath et al.

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*This work supported in part by the U.S. Department of Energy under DE-FC02-04ER54698 and General Atomics internal funding.