ENGINEERING DESIGN OF A RADIATIVE DIVERTOR FOR DIII–D*

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A new divertor of slotted configuration is presently being developed for the DIII–D tokamak. This divertor will operate in the radiative mode. Experiments and modeling form the basis for the new design. The Radiative Divertor reduces the heat flux on the divertor plates by dispersing the power with radiation. In addition, the Radiative Divertor structure will allow density control in plasma shapes with high triangularity (>0.8) required for advanced tokamak operation. The divertor structure allows for operation in either double-null or single-null plasma configurations. Some of the structural components will be manufactured from a vanadium alloy to demonstrate fabrication processes including welding and to demonstrate environmental compatibility with the tokamak. Four independently controlled divertor cryopumps will enable pumping at either the inboard (upper and lower) or the outboard (upper and lower) divertor plates. An upgrade to the DIII–D cryogenic system is part of this project. The increased capabilities of the cryogenic system will allow delivery of liquid helium and nitrogen to the three new cryopumps.

The Radiative Divertor design is extremely flexible, and will allow physics studies of the effects of slot width and height. The slot width is varied by installing graphite tiles of different geometry and can be accomplished in a shut down of less than 3 weeks. The change in slot length requires moving the structure vertically and is proposed to be done on an annual basis in about 6–8 weeks. Slot lengths of 23, 33, and 43 cm have been chosen.

Diagnostics for the Radiative Divertor are being designed in parallel to provide comprehensive measurements for diagnosing the divertor. The Radiative Divertor installation will occur in summer and winter of 1996. Engineering experience gained in the DIII–D Advanced Divertor program form a foundation for the design work on the Radiative Divertor.

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