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Category Number and Subject: 5.6.2 DIII-D tokamak

Theory Experiment

Compatibility of the Radiating Divertor with Hybrid Plasmas in DIII-D,* T.W. Petrie, N.H. Brooks, A.W. Hyatt, A.W. Leonard, M.J. Schaffer, M.R. Wade, W.P. West, GA, M.E. Fenstermacher, M. Groth, C.J. Lasnier, LLNL, J.G. Watkins, SNL – Seeding the divertor with impurities to enhance the power radiated upstream of the divertor target was successfully carried out in the DIII-D “hybrid” H-mode regime. Argon was puffed directly into the divertor, while deuterium gas D_2 was injected into the scrape-off layer upstream of the divertor. When the argon gas injection rate Γ_{AR} was raised to a level which caused the ratio of total radiated power to power input to increase from 0.46 to 0.62, we found equal increases in the radiated power from the divertor and the core, reductions in heat flux at the divertor target of almost a factor of two, and energy confinement unchanged. For a fixed D_2 injection rate, both the radiated power and argon density in the core plasma were proportional to Γ_{AR} , suggesting that feedback control over the radiated power using Γ_{AR} may be possible. Divertor enrichment >30 were determined for these plasmas.

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