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High Performance Double-null Plasma Operation Under Radiating Divertor Conditions[1] T.W. PETRIE, T. OSBORNE, A.W. LEONARD, T.C. LUCE, C.C. PETTY, General Atomics, M.E. FENSTERMACHER, C.J. LASNIER, Lawrence LIvermore National Laboratory, F. TURCO, Columbia University, J.G. WATKINS, Sandia National Laboratory — We report on heat flux reduction experiments in which deuterium/neon- or deuterium/argon-based radiating mantle/divertor approaches were applied to high performance double-null (DN) plasmas (H98≈1.4-1.7,$\beta_N \approx 4, q95 \approx 6$) with a combined neutral beam and ECH power input $P_{IN} \approx 15$ MW. When the radial location of the ECH deposition is close to the magnetic axis (e.g., $\rho \leq 0.20$), the radial profiles of both injected and intrinsic impurities are flat to somewhat hollow. For deposition farther out (e.g., $\rho = 0.45$), the impurity profiles are highly peaked on axis, which would make high performance DN operation with impurity injection more problematical. Comparison of neon with argon seeding with respect to core dilution, energy confinement, and heat flux reduction under these conditions favors argon. Conditions that lead to an improved τ_E as predicted previously from ELITE code analysis, i.e., very high P_{IN}, proximity to magnetic balance, and higher q95, are largely consistent with this data.

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