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3D Magnetic Perturbation Effects on Transport in Tokamaks[1]
T.E. EVANS, GA, T.L. RHODES, L. ZENG, UCSD, G.R. MCKEE, U. Wisc. Madison, D.M. ORLOV, R.A. MOYER, G.R. TYNAN, W. XIAO, UCSD, R. NAZIKIAN, PPPL — Recent experimental results in DIII-D H-mode plasmas, with a constant level of applied n=3 perturbation fields, have revealed dramatic particle, energy and momentum transport changes simply by altering the relative toroidal phase between the intrinsic n=1 and 2 field-errors and the applied n=3 perturbation field. Here, we present a summary of the experimental observations, including changes in the turbulence and MHD behavior in configurations with either constructive or destructive interference between the intrinsic n=1 and 2 fields and the applied n=3 field. A particularly interesting aspect of these results is that the energy confinement increases by ∼35% when the intrinsic and applied perturbation fields are relatively well aligned to produce a larger total radial field. Similar increases are seen in the particle and momentum confinement. These observations are compared to a hypothesis connecting the structure of the 3D radial magnetic perturbation field to the changes in transport.

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