

Parallel Energy Transport in Detached DIII-D Divertor Plasmas

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A comparison of experiment and modeling of detached divertor plasmas in DIII-D is examined in the context of parallel energy transport due to electron conduction and plasma convection in order to validate and improve models used for divertor design. Power balance analysis is carried out to determine parallel heat flux and energy dissipation as a function of distance from the divertor target. The relative fractions of conductive and convective heat flux are determined from Thomson scattering measurements of the divertor parallel T_e gradient. Modeling with the fluid code SOLPS is found to underestimate divertor heat flux radiative dissipation due to two effects, 1) lower values of parallel convection than inferred from experiment and 2) lower impurity radiation than measured experimentally at similar values of T_e . Resolution of these discrepancies is expected to improve accuracy and confidence for predictive modeling of divertor operation in future devices.

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