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Cross-Field Thermal Diffusion in Limiter and Divertor SOL, in the Conduction-Limited Regime ROBERT GOLDSTON, Princeton Plasma Physics Laboratory — Earlier work based on a 2-D thermal diffusion code showed that scrapers in the SOL of divertor plasmas should receive much greater heat flux near their tips than projected by standard analyses. Indeed dP/dr diverges as $(r - r_{tip})^{-1/2}$ because the cold region defined by the scraper surface concentrates heat flow. The same high heat flux is deduced for limiters at the plasma contact point, doubling from the projected value at a distance $\delta r \sim \lambda_{SOL}/8$ from the limiter tip, perhaps consistent with recent IR measurements on JET. Since dl/dr along a parabolic limiter has a complementary divergence, the peak in the heat flux can be mitigated with such shaping. The same thermal diffusion code has been used to analyze the Eich/Wagner model for divertor target heat flux, in which an exponential heat flux profile is posited at the X-point, and is then convolved with a Gaussian to represent thermal diffusion along the divertor leg. This model is formally only applicable for convective parallel heat flux, with radially-independent velocity, coupled with radially-independent cross-field diffusion. These assumptions are likely incorrect, but in both experiments and these computations, the Eich/Wagner model fits results well. The method is shown to be very effective in deconvolving the original exponential term from data in conditions strongly violating the model assumptions. Its usefulness for determining diffusivity along the divertor leg will be explored. This work supported by DOE Contract #DE-AC02-09CH11466.

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