

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

When is it Valid to Assume that Heat Flux is Parallel to B ?¹

ROBERT GOLDSTON, Princeton Plasma Physics Laboratory — It is frequently assumed that heat flow in the plasma scrape-off-layer is everywhere parallel to \mathbf{B} , due to the strong anisotropy in electron thermal conductivity. This assumption is convenient but paradoxical. Here are examined three situations where this assumption has sometimes been applied: 1) extrapolating from midplane $Te(R)$ measurements to divertor heat flux profile, 2) determining the location of the separatrix from measured midplane $Te(R)$, combined with total heat flux leaving the plasma, and 3) predicting the heat flux to plasma-facing components in the scrape-off-layer of diverted plasmas. Numerical solution of the anisotropic, nonlinear heat equation suggests that the first application is poor, the second well justified, and the third very far from accurate. Additional plasma physics effects may mitigate these results, but the simple assumption of dominant parallel heat flow due to anisotropy in electron thermal conductivity is not supported in many important cases.

¹This work supported by U.S. DOE Contract # DE-AC02-09CH11466.

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Date submitted: 16 Jul 2010

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