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Measurements of plasma sheath heat flux in the Alcator C-Mod divertor[1] DAN BRUNNER, BRIAN LABOMBARD, JIM TERRY, MATT REINKE — Heat flux is one of the most important parameters controlling the lifetime of first-wall components in fusion experiments and reactors. The sheath heat flux coefficient (γ) is a parameter relating heat flux (from a plasma to a material surface) to the electron temperature and ion saturation current. Being such a simple expression for a kinetic process, it is of great interest to plasma edge fluid modelers. Under the assumptions of equal ion and electron temperatures, no secondary electron emission, and no net current to the surface the value of γ is approximately 7 [1]. Alcator C-Mod provides a unique opportunity among today's experiments to measure reactor-relevant heat fluxes (100's of MW/m^2 parallel to the magnetic field) in reactor-like divertor geometry. Motivated by the DoE 2010 joint milestone to measure heat flux footprints, the lower outer divertor of Alcator has been instrumented with a suite of Langmuir probes, novel surface thermocouples, and calorimeters in tiles purposefully ramped to eliminate shadowing; all within view of an IR camera. Initial results indicate that the experimentally inferred values of γ are found to agree with simple theory in the sheath limited regime and diverges to lower values as the density increases.

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Dan Brunner
MIT

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