Abstract Submitted
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Sorting Category: 6.6.2 (Experimental)

Thermal Stability of a Tokamak Plasma System with Classical Thermal Diffusivity[1] C.-L. HSIEH, B. BRAY, General Atomics — The formation of a transport barrier in the plasma interior, as shown in many Tokamak experiments, has lowered the observed ion thermal diffusivity to values comparable to neoclassical estimates. It is generally assumed that, once the plasma instabilities are suppressed, the plasma interior would have to rely upon the classical mechanism for heat transport. Hence, it is of interest to study how the classical diffusivity operate. For instance, could the mechanism establish and maintain a stable temperature profile? Different from Bohm diffusivity, the classical diffusivity has an inverse dependence on the plasma temperature. That is, an increase in temperature reduces the diffusivity and the local heat flow for a region with sufficiently weak temperature gradients; as a result, the local temperature may increase further, a potential situation for instability. Without thermal stability, it is doubtful that the classical system can ever come into existence. A model is being developed to study the stability problem in two steps: first to find the solution for the steady state temperature profile, then to apply small temperature perturbations. The resultant diffusion equations are highly nonlinear and are being studied using numerical techniques.

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☐ Prefer Oral Session
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Special instructions: Transport (Core), immediately following TC Jernigan

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