Abstract Submitted
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Non-local effects on neoclassical flows and fluxes in transport barriers[1] PETER J. CATTO, FELIX I. PARRA[2], Massachusetts Institute of Technology, GRIGORY KAGAN, Los Alamos National Laboratory, MATTHEW LANDREMAN[3], Massachusetts Institute of Technology — We present the extension of the results in [1] and subsequent references for neoclassical theory in transport barriers with gradient scale lengths comparable to the ion poloidal gyroradius. There are two new main features. First, utilizing the smallness of the inverse aspect ratio, it is possible to formulate a delta-f theory with an ion temperature gradient comparable to the pressure and electrostatic potential gradients, thereby generalizing the results of [1] and subsequent references. Second, the delta-f theory that we have obtained shows certain non-local effects. The non-locality is a result of a new condition to determine the ion poloidal flow that is obtained from a rigorous asymptotic expansion in the inverse aspect ratio, instead of by imposing momentum conservation for a model collision operator. In transport barriers, the standard neoclassical formula that relates the ion poloidal flow to local gradients fails, and the ion poloidal flow will depend on the density, temperature and electrostatic potential profile throughout the transport barrier. A result of this non-locality is that one needs to reexamine the standard results for the neoclassical ion particle flux. **References.** [1] G. Kagan and P.J. Catto, *Plasma Phys. Control. Fusion* **52**, 055004 (2010)

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