Transport suppression by shear reduction JULIO MARTINELL,
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Laboratory — The relationship between transport and shear is a problem of con-
siderable interest to magnetically confined plasmas. It is well known that there are
cases in which an increase of flow shear can lead to a reduction of turbulent trans-
port. However, this is not a generic result, and there are transport problems in which
the opposite is the case. In particular, as originally discussed in Ref. 1, barriers to
chaotic transport typically form in regions of vanishing shear. This property, which
is generic to the so-called non-twist Hamiltonian systems 2, explains the observed
resilience of transport barriers in non-monotonic zonal flows in plasmas and fluids
and the robustness of shearless magnetic surfaces in reverse shear configurations.
Here we study the role of finite Larmor radius (FLR) effects on the suppression of
chaotic transport by shear reduction in a simplified model. Following Ref. 3 we
consider a model consisting of a superposition of drift waves and a non-monotonic
zonal flow. The FLR effects are incorporated by gyroaveraging the $E \times B$ velocity,
and transport is studied by following the evolution of ensembles of test particles.

1del-Castillo-Negrete and Morrison, Phys. Fluids A 5, 948 (1993)
2del-Castillo-Negrete, Greene, and Morrison, Physica D 91, 1 (1996)