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Transport Barrier Restoration due to Particle Orbit Gyroaveraging JULIO MARTINELL, ICN-UNAM, DIEGO DEL-CASTILLO-NEGRETE, ORNL — Test particle $E \times B$ transport in a tokamak can be studied using a Hamiltonian approach in which the effect of drift waves acts as a perturbation on the background flow. For a zonal flow the nonmonotonic velocity profile gives rise to a nontwist Hamiltonian that has a robust central transport barrier at about the same position of the velocity maximum. This barrier can break for high enough level of the perturbation leading to global chaos of particle motion. When a gyroaveraging due to finite Larmor radius (FLR) is performed, several novel effects are observed: Bifurcations leading to separatrix reconnection appear at large FLR; Destroyed barriers can be restored for increasing FLR; Threshold radius for barrier destruction depends on perturbation strength and the threshold curve has a fractal structure. This curve is obtained for cases with both heteroclinic and homoclinic topologies. The effect of the changing barrier structure is studied for an ensemble of particles with a thermal distribution of Larmor radii.

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