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Calculation of ion distribution functions and neoclassical transport in the edge of single-null divertor tokamaks[1] T.D. ROGNLIEN, R.H. COHEN, X.Q. XU, LLNL — The ion distribution function in the H-mode pedestal region and outward across the magnetic separatrix is expected to have a substantial non-Maxwellian character owing to the large banana orbits and steep gradients in temperature and density. The 4D (2r,2v) version of the TEMPEST continuum gyrokinetic code is used with a Coulomb collision model to calculate the ion distribution in a single-null tokamak geometry throughout the pedestal/scrape-off-layer regions. The mean density, parallel velocity, and energy radial profiles are shown at various poloidal locations. The collisions cause neoclassical energy transport through the pedestal that is then lost to the divertor plates along the open field lines outside the separatrix. The resulting heat flux profiles at the inner and outer divertor plates are presented and discussed, including asymmetries that depend on the B-field direction. Of particular focus is the effect on ion profiles and fluxes of a radial electric field exhibiting a deep well just inside the separatrix, which reduces the width of the banana orbits by the well-known squeezing effect.

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