QIP3D: A Code to Solve the Quiet Implicit PIC (QIP) Moment Equations in Toroidal Geometry DAVE NYSTROM, Los Alamos National Laboratory — A computer program, QIP3D, has been developed to solve the Quiet Implicit Particle-in-cell (QIP) moment equations in three-dimensional toroidal geometry. This model provides an efficient algorithm for computing the time evolution of the full two-fluid (ion/electron) plasma. A Fourier, pseudospectral representation is employed for the poloidal and toroidal angles and finite differencing for the radial coordinate. The QIP equations are differenced implicitly in time and solved using a predictor-corrector algorithm. The implicit electric field equation (and other elliptic equations) are solved using preconditioned Krylov space iterative methods. Calculations have been performed to study the linear theory of the ideal internal kink mode as a function of poloidal beta and aspect ratio. These results will be presented along with plans for the future development of QIP3D.

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