Abstract Submitted
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Efficient Non-Fourier Implementation of Landau-Fluid Operators in the BOUT++ Code[1] A.M. DIMITS, I. JOSEPH, M.V. UMANSKY, P.W. XI[2], X.Q. XU, LLNL — Tokamak edge plasmas have regions in which kinetic effects are important, which strongly motivates the implementation of Landau-fluid operators in edge-plasma fluid codes such as BOUT++. However, they also have significant spatial inhomogeneities and complicated boundary conditions, which pose significant difficulties for the standard Fourier implementations. We have therefore developed non-Fourier, configuration-space-based approaches for the computation of these operators. One of these is a "fast" method, with Fourier-like computational scaling, based on an accurate and tunable approximation that can be numerically implemented through the solution of tridiagonal or narrowly banded matrix equations. Another approach, which is useful for moderate mesh sizes, is the direct discretization of the spatial kernel and its application via standard matrix multiplication algorithms. Investigations of the accuracy and computational efficiency of these approaches have been completed and will be presented. We will also show the effects of the inclusion of the Landau-fluid closures in BOUT++ simulations on a variety of linear and turbulent microinstability-drivent test cases.

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