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A upwind PPM with limiter for tokamak edge plasmas simulation under BOUT++ framework[1] CHENHAO MA, Peking University, XUEQIAO XU, Lawrence Livermore National Laboratory — To study the propagation of blobs driven by edge plasma instability, the PPM should be applied to improve numerical accuracy. The upwind Piecewise Parabolic Method(PPM) with limiter preserves accuracy at smooth extrema. The interpolated values only at extrema is restricted by non-linear combinations of various different approximations of the second order derivatives. This method has the same accuracy for smooth initial data as PPM without limiter and preserves shape of initial data exactly during its propagation. BOUT++ is a C++ framework for 3D plasma fluid simulation in real geometry, including both open and closed field lines, and was developed in part from the original fluid edge code BOUT. Our goal is to implement the PPM with limiter as one of numerical differencing methods in BOUT++'s library. Because the spatial scale of blobs driven by edge plasma instability are typically ten times smaller than the simulation region, the PPM with limiter will preserve the shape of blobs exactly at smooth extrema and provide better long time simulation result.

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