

Abstract Submitted
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Development of PIC-Fluid hybrid scheme for impurity generation and transport in BOUT++ framework XIAOTAO XIAO, CASIPP, LLNL, XUEQIAO XU, LLNL — Impurity generation and transport are an important topic of research in burning plasmas in order to avoid a significant degradation of the fusion capabilities of a reactor device. It is a critical issue for RF experiments due to the phenomenon of rf-enhanced impurity generation. In tokamaks, the impurity transport is usually complicated by the combination of turbulent-driven transport and neoclassical transport, So developing the PIC module in BOUT++ framework, which simulates tokamak edge plasmas using fluid models, will enhance the capability to efficiently simulate both turbulence and neoclassical physics in realistic geometry. The research will be carried out mainly in two steps: a test particle module, in which the orbits is advanced in given background plasma with turbulent electromagnetic field from BOUT++ edge turbulence simulations to yield the spatial distribution of impurities in edge plasmas from given sources at the divertor plates and at the protection limiters near RF antennas; and then a PIC-fluid hybrid module, in which background plasma and the turbulent electromagnetic fields will change with the impurity particle sources. The main issues such as particle weighting and sorting scheme, the communication between the fluid and the PIC parts, are discussed.

Xiaotao Xiao
CASIPP, LLNL

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