Simulations of plasma response to RMP with BOUT++ code

BIN GUI, Institute of Plasma Physics, Chinese Academy of Sciences, XUEQIAO XU, Lawrence Livermore National Laboratory — BOUT++ code is a framework which developed to simulate 3-dimensional fluid equations in curvilinear coordinates (Dudson, et al., Computer Physics Communications, 2009). Here we developed an ideal two-field model (vorticity and Ampere’s law) to simulate the influence of resonant magnetic perturbation (RMP) on the pedestal plasmas. The vacuum RMP field is self-consistently calculated and included in the two-field model. The current sheets at resonant surface are found, and the radial magnetic field distribution of vacuum RMP and total magnetic field strength are compared. The influence of resistivity on the current sheets is also studied in this model. Based on this work, the radial magnetic field perturbation includes the vacuum RMP component and plasma response in the pedestal region is obtained. By applying the magnetic field perturbation in the peeling-ballooning mode simulation, the influence of RMP on the pedestal plasma could be studied in L-mode, H-mode and ELM discharges.