

Abstract Submitted
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Simulations of Edge Current Driven Kink Modes with BOUT++ code¹ G.Q. LI, Institute of Plasma Physics, CAS, X.Q. XU, Lawrence Livermore National Laboratory, P.B. SNYDER, A.D. TURNBULL, General Atomics, T.Y. XIA, Institute of Plasma Physics, CAS, C.H. MA, P.W. XI, Peking University — Edge kink modes (or peeling modes) play a key role in the ELMs. The edge kink modes are driven by peak edge current, which comes from the bootstrap current. We calculated sequences of equilibria with different edge current using CORSICA by keeping total current and pressure profile fixed. Based on these equilibria, with the 3-field BOUT++ code, we calculated the MHD instabilities driven by edge current. For linear low-n ideal MHD modes, BOUT++ results agree with GATO results. With the edge current increasing, the dominant modes are changed from high-n ballooning modes to low-n kink modes. The edge current provides also stabilizing effects on high-n ballooning modes. Furthermore, for edge current scan without keeping total current fixed, the increasing edge current can stabilize the high-n ballooning modes and cannot drive kink modes. The diamagnetic effect can stabilize the high-n ballooning modes, but has no effect on the low-n kink modes. Also, the nonlinear behavior of kink modes is analyzed.

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T.Y. Xia
Institute of Plasma Physics, CAS

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