MHD simulations of ELMs using the BOUT++ code B.D. DUD-
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— The new BOUT++ code [1] is an extensible tool for studying non- linear plasma
phenomena such as ELMs. It is capable of solving an arbitrary number of scalar and
vector fluid equations in curvilinear geometry, and has been benchmarked against
analytically solvable problems, and other codes in X-point geometry. Here we present
linear simulations of 3-field reduced MHD for plasmas with circular cross-section,
and compare with the ELITE linear MHD code [2,3]. These show good agreement
in both the mode structure and growth rates, giving confidence that BOUT++ can
reproduce the ideal ballooning mode. Suppression of ballooning modes by diamag-
netic and flow-shear effects is demonstrated. Non-linear development of ballooning
modes has been studied, showing eruption of filaments from the plasma edge, which
are observed to accelerate outwards. Finally, the effect of non-asymmetric pertur-
bations will be studied, in both the linear and non-linear regimes to understand
the effect of resonant magnetic perturbations on ELMs. [1] B.D.Dudson et. al.
Pre-print arXiv.org:0810.5757 [2] P.B.Snyder et. al. Phys. Plas. 9 (2002) 2037 [3]
H.R.Wilson et. al. Phys. Plas. 9 (2002) 1277

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