Abstract Submitted
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The current understanding of transitions from large to small ELMs and to edge turbulence with no ELMs[1] X.Q. XU, LLNL, AND BOUT++ INTERNATIONAL COLLABORATION TEAM — A suite of two-fluid models has been implemented in BOUT++ for all ELM regimes and fluid turbulence. A suite of gyro-fluid models is under development for pedestal turbulence and transport. A suite of 3D neutral and impurity models is also under development for SMBI, recycling, gas puffing, and for sputtering from RF antennas and divertor plates. Progress in several key areas of research will be presented: upshift of PB instability thresholds due to background turbulence; ELM power deposition on the divertor plates; identification of top pedestal micro-turbulence zone for ELM spreading and pedestal peak gradient MHD zone for ELM crashing For a ballooning-dominated equilibrium, we find that both pressure gradient and pedestal density can control the transition from large ELMs to small ELMs. Small elms can be either resistive or ideal P-B modes; the density dependence of the Elm size is due to ion diamagnetic stabilization, not due to collisionality. The flux limited expressions of parallel thermal diffusivities show weak or no collisionality dependence, even in the SOL. A decrease of the ELM size with density is a natural consequence for ballooning modes. For a peeling-dominated equilibrium and for typical experimental scenarios with natural transition between peeling dominated and ballooning dominated equilibria during the pedestal buildup, the scaling characteristics of the ELMs size will also be presented.

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