Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Incorporating pedestals with feedback into sandpile models for fusion plasmas CRAIG BOWIE, MATTHEW HOLE, Australian National University — The pedestal in a H-mode fusion plasma is thought to result from shear flow induced by a radial electric field. The size of the pedestal relates to the Larmor radius of the ions, and in turn to their temperature. This creates a feedback mechanism within the plasma as temperature changes cause changes in pedestal size. We present here modifications of a sandpile model (S C Chapman, Phys. Rev. E 62, 1905 (2000)) in which we incorporate feedback effects. A key parameter, L_f, defines the distance over which the sandpile can interact with itself, analogous to shear flow in the plasma. Decreasing the value of L_f increases the energy in the sandpile. By changing L_f at the edge of the sandpile over a distance related to the energy of the system, we produce a pedestal, and introduce an element of feedback analogous to changes in the shear flow in a fusion plasma. We also show other variants of the model which produce pedestals without introducing feedback. We observe that maximum waiting times between mass loss events (MLEs), and maximum MLE sizes, grow with pedestal size, consistent with the behaviour of ELMs in a fusion plasma, and that this occurs only in the presence of feedback in the model.

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Date submitted: 26 Jun 2017 Electronic form version 1.4