Abstract Submitted
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ELMs explained as resistive vacuum modes excited by SOL current onset[1] J.W. VAN DAM, L.J. ZHENG, M. KOTSCHENREUTHER, IFS, UT-Austin, H. TAKAHASHI, E. FREDRICKSON, PPPL — Recent DIII-D experiments show that SOL current onset occurs slightly before the edge electron temperature collapse associated with ELMs. We propose the excitation of resistive vacuum modes during SOL current onset as an explanation for ELMs. Wall effects are weak for high-n modes; however, for high-n modes, a vacuum region with resistive plasma can play a similar role to a resistive wall. High-n resistive vacuum external modes can be excited above a critical plasma beta limit and then resonantly enhanced by SOL current onset. In turn, enhanced MHD activity causes stronger radial transport and induces a larger SOL current. This process explains the initial bursting nature of ELMs. The radial transport also reduces the pedestal pressure gradient, which stabilizes the resistive vacuum modes in the later ELM stage. The ELM cycle repeats when heating again increases the beta value.

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