

Abstract Submitted
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Nonlinear Ballooning Instability in the Vicinity of a Separatrix¹ P. ZHU, C.C. HEGNA, C.R. SOVINEC, University of Wisconsin-Madison — A recent study suggests the presence of a magnetic separatrix may have a unique role in ELM dynamics [1]. More generally, it is not clear if the presence of magnetic separatrix is a prerequisite for the onset of ELMs. In this work, we examine the effects of the magnetic separatrix on the nonlinear dynamics of ballooning instabilities in the H-mode pedestal region of a divertor tokamak, and compare the results to similar analyses applied to limiter tokamaks. Both MHD theory and simulations are being developed to model the linear and nonlinear properties of the ballooning instability in the vicinity of a separatrix. Previous work on the intermediate nonlinear ballooning regime [2] is extended to include the geometry effects of the magnetic separatrix and X-point. The physical significance of the field line stochasticity induced by the separatrix configuration during the late nonlinear stage of ballooning instability will be discussed.

[1] L. Sugiyama and H. Strauss, ELMs: A new type of plasma instability, CEMM Workshop, May 2 2009, Denver, CO.

[2] P. Zhu, C.C. Hegna, and C.R. Sovinec, Phys. Rev. Lett. 102, 235003 (2009).

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