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Theoretical explanation for edge localized modes and their connection to blob transport LINJIN ZHENG, IFS, Univ. Texas-Austin, H. TAKAHASHI, E. FREDRICKSON, PPPL, Princeton Univ. — Theoretical explanation for edge localized modes is presented. We show that there is a positive feedback process between the external MHD modes and the SOL current. The initial magnetic perturbation at the pedestal causes radial transport, that discharges the pedestal heat and particles to the SOL and results in the bursting of the SOL current. In turn, the SOL current bursting can induce a stronger magnetic perturbation at the pedestal. This positive feedback causes the edge MHD modes to grow nonlinearly and sharply even near the linear MHD marginal stability limit, leading to the ELM burst. We also discuss the connection with the blob transport. It is pointed out that the excitation of the SOL current may generate the filament structure and thermally detach it from the core plasma due to the formation of magnetic island and its surrounding stochastic region. We think that the unbalanced plasma and magnetic pressure due to the filament curvature may be a direct explanation to the blob transport toward the wall. We analogize the blob force unbalance to the tokamak plasma without the vertical magnetic field applied — missing the inward force due to the curl product of the vertical field and the toroidal current to balance the outward force. Research supported by DOE grant DE-FG02-04ER54742 and DE-AC02-76CH03073.

Linjin Zheng
Institute for Fusion Studies, Univ. Texas-Austin

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