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Formation of Filamentary Structure during ELMs in Spherical Tokamak TAKAYA HAYASHI, NAOKI MIZUGUCHI, National Institute for Fusion Science, RIAZ KHAN, Sokendai — We execute nonlinear MHD simulations in full toroidal geometry to study relaxation phenomena that occur in the edge region of spherical tokamak. The simulation of a resistive MHD regime reproduces the formation of filamentary structure; the numbers of filament observed are consistent with the experimental observation. Our simulation supports the ballooning nature of filamentary structure, erupted on steep pressure gradients in the edge region as observed in recent experiments of MAST and NSTX. About 9 fingers appear in the nonlinear phase. In results eruption of filament occur from the ridges of finger. By adding a simple model of FLR term, successful stabilization of higher mode number in the linear phase and sudden excitation of those higher modes in the nonlinear phase are observed. The excitation of the higher modes is considered to be induced by nonlinear couplings among dominant lower modes. The plasma flow pattern in the MHD case follows a twin vortex pattern in the nonlinear phase, where as in the FLR case it follows a single vortex pattern. The growth rate changes with the introduction of the FLR term, both in the linear as well as the nonlinear phase.

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