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Evidence for density-gradient-driven trapped-electron modes in improved confinement RFP plasmas JAMES DUFF, BRETT CHAPMAN, JOHN SARFF, PAUL TERRY, ZACH WILLIAMS, Univ. Of Wisconsin, WEIXING DING, DAVID BROWER, ELI PARKE, UCLA — Density fluctuations in the large-density-gradient region of improved-confinement MST RFP plasmas exhibit features characteristic of the trapped-electron-mode (TEM), strong evidence that drift wave turbulence emerges in RFP plasmas when magnetic transport is reduced. In standard RFP plasmas, core transport is governed by magnetic stochasticity stemming from current-driven tearing modes. Using inductive control, these tearing modes are reduced, improving confinement. The improved confinement is associated with substantial increases in the density and temperature gradients, and we present evidence for the onset of drift wave instability. Density fluctuations are measured with a multi-chord, laser-based interferometer. These fluctuations have wavenumbers $k_\phi * \rho_s$ <0.14, frequencies characteristic of drift waves (>50 kHz), and are clearly distinct from residual global tearing modes. Their amplitudes increase with the local density gradient, and require a critical density gradient. Gyrokinetic analysis provides supporting evidence of microinstability in these plasmas, in which the density-gradient-driven TEM is most unstable. The experimental threshold gradient is close to the predicted critical gradient for linear stability. Work supported by DOE.

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