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Toroidal and slab ETG instability dominance in the linear spectrum of JET-ILW pedestals[1] JASON F. PARISI, FELIX I. PARRA, University of Oxford, COLIN M. ROACH, CARINE GIROUD, Culham Centre for Fusion Energy, NOBUYUKI AIBI, Rokkasho Fusion Institute, MICHAEL BARNES, PLAVEN G. IVANOV, University of Oxford — Electron temperature gradient (ETG) physics is shown to dominate the linear gyrokinetic spectrum in JET-ILW pedestals where the ion temperature is measured. Local linear gyrokinetic simulations of JET pedestal shots 82550, 92167, and 92174, demonstrate that with the exception of kinetic ballooning modes (KBMs), microinstabilities are driven mainly by the electron temperature gradient — many of these instabilities exist at transport-relevant scales. The ion temperature gradient (ITG) instability is subdominant or absent, and both KBMs and ITG are shown to be suppressed by $\mathbf{E}\times\mathbf{B}$ shear. Electron temperature gradients are particularly large, causing ETG instabilities to be driven at perpendicular scales larger than in the core by a factor of $R_0/L_{Te} > \sqrt{m_i T_{0i}/m_e T_{0e}}$. Results show ETG instability dominating at $k_y\rho_i > 0.5$, which is mainly toroidal at low k_y and slab at larger k_y. The toroidal ETG mode has a sufficiently large radial wavenumber that electron finite Larmor radius (FLR) effects become important; that is, $k_y\rho_i \sim 1$, but $K_x\rho_e \sim 1$, where K_x is the effective radial wavenumber. We also calculate the ETG stability boundary for general perpendicular and parallel wavenumbers.

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