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Dephasing and Phase-Pinning: Dual Role of Radial Electric Field in Edge MHD Dynamics of Toroidally Confined Plasmas[1] YI ZHANG, ZHIBIN GUO, State Key Laboratory of Nuclear Physics and Technology, Fusion Simulation Center, School of Physics, Peking University, Beijing 100871, China, PATRICK H DIAMOND, University of California San Diego, La Jolla, California 92093, USA — We propose a new understanding of how the radial electric field (E_r) impacts the edge magnetohydrodynamic (MHD) instabilities. The analysis uncovered that E_r-shear stabilizes the Peeling-Ballooning modes, while E_r-curvature destabilizes the low-n kink/peeling modes. The underlying physical mechanism is that the perturbed radial velocity and displacement become stronger dephasing or phase pinning. More specifically, the ratio of E_r-curvature to E_r-shear could be measured to quantify their relative competition strength.

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