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Edge stability analysis for a DIII-D EHO plasma

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In quiescent H-mode (QH-mode) regime, the edge harmonics oscillations (EHOs) are believed to provide necessary transport to eliminate edge localized modes by dynamics of the plasma itself. A detailed experimental and modeling comparison has been made for low-n (n=1,2) EHO in DIII-D QH-mode plasmas by MARS-F/K/Q code. For both n=1 and n=2, the range of poloidal mode number is set from -9 to 49, and the mode is strongly peaked near the plasma edge. From linear simulation, resistive DIII-D wall has little effect on this instability. With the Spitzer resistivity model, scaling of S^{-1/3} is derived for the mode, which has the feature of edge localized infernal mode. It is found that the plasma toroidal flow has a slight stabilization effect on this instability. Different proportion of fluid and ExB flow has also been considered, which indicates the similar mode eigenfunction except the mode is more peaked with larger ExB proportion. Two methods of calculating the temperature and density fluctuations demonstrate the consistent results, which have a good agreement with the experimental data. Moreover, the numerical mode structure also can be compared to measurements of magnetic poloidal sensor array.