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Stability Threshold of Ion Temperature Gradient Driven Mode in RFP plasmas[1] SHICHONG GUO, Consorzio RFX, Italy — The Ion Temperature Gradient driven (ITG) mode and the related transport are of current interest in the RFP community. To understand the behavior of this mode in RFP plasmas; as the first step, the linear threshold of ITG mode in the RFP configuration is investigated in the small Larmor radius limit. Compared to tokamak, RFP configuration has a shorter connection length and stronger magnetic curvature drift. These effects result in a stronger instability driving mechanism in the fluid limit. However, the kinetic damping effects (Landau and magnetic drift resonance) also become stronger than those in tokamak; which ultimately determine the stability threshold. The numerical analysis shows that the ITG (adiabatic electrons) instability in RFPs requires a rather steep temperature profile, which usually may not exist in the plasma core of the current RFP experiments. The required temperature slope may be found in the very edge of the plasma where the temperature cools down rapidly near vacuum vessel or near the board of the dominant magnetic island during the quasi-single helicity state of the discharge. The case of positive density gradient of the plasma and/or trapped electron effects will also be discussed.

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