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Effects of trapped electrons and impurity ions on ITG modes in reversed-field pinch plasmas

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The ion temperature gradient (ITG) driven electrostatic modes in reversed-field pinch (RFP) plasma are studied with inclusion of trapped electrons and impurity ions in the gyrokinetic integral equation. The effects of magnetic shear, safety factor, electron density gradient, electron to ion temperature ratio, temperature gradient of trapped electrons are studied. As is well known, the ITG modes in RFPs are more stable than that in tokamaks, and are hard to be excited. However, it is demonstrated that the impurity ions with density gradients opposite to that of primary ions enhance the ITG instabilities. The trapped electrons also have destabilization effect on ITG modes. In addition, trapped electron modes are found unstable in certain parameter regimes when ion temperature gradient does not exist.

References

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