Impurity transport modeled with the TERESA code

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The coupling of trapped ion mode (TIM) and trapped electron mode (TEM) in the presence of impurity ions is numerically investigated in toroidal collisionless plasmas, using the gyrokinetic code TERESA (Trapped Element REduction in Semi lagrangian Approach). The 4D-model used in this code enables the study of a full f problem for ion, electron and impurity trapped particles at very low numerical cost. The response of the passing particles is assumed to follow the adiabatic approximation.

The linear growth rates of TEM or TIM obtained with the full f nonlinear code for different impurity species and for different concentrations are successfully compared with analytical predictions.

The gyrokinetic code is then used to study the influence of the impurity density profile on the nature of the dominant instability (TEM or TIM) and its consequence on the nonlinear behavior.

Finally, the effect of the temperature profile as well as the charge number Z on impurity flux and transport coefficients is discussed.

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