Evolution of the Kelvin-Helmholtz instability in an inhomogeneous plasma: Momentum density shear model

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Most of previous studies of the Kelvin-Helmholtz instability in an inhomogeneous plasma [ex. Huba, 1996; Amerstorfer et al., 2010] assumed a hyperbolic tangent profile for the initial condition of the velocity shear. However, this assumption produces an unrealistic momentum density profile within the shear layer, that is, the tangential momentum density has its peak in the middle of the shear layer if it is measured in the rest frame of for example the high density plasma. We compare the evolution of the Kelvin-Helmholtz instability in an inhomogenous plasma using a velocity shear model, where the initial shear profile is determined based on the tangential bulk velocities, and a momentum density shear model, where the initial shear profile is determined based on the tangential momentum densities, and show the growth rate and mixing rate are diminished in the latter model.