The effects of dissipation and magnetic twist on the formation of the Kelvin-Helmholtz instability in oscillating coronal loops.

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Many observations of transversely oscillating coronal loops have detected damping rates far in excess of those predicted by the expected levels of dissipation in the corona. It is widely anticipated that the process of resonant absorption is responsible for this phenomenon. In the presence of a non-uniform density profile, a resonance will efficiently transfer energy from the loop's kink mode oscillation to localised Alfvenic waves contained within the loop boundary. These azimuthal wave modes are susceptible to dissipation through phase mixing. However, unless transport coefficients are enhanced by many orders of magnitude above the predicted coronal values, the heating rate is typically small.

On the other hand, the onset of MHD turbulence can enhance the dissipation rate by generating even smaller length scales. One potential trigger of turbulent flows is the Kelvin-Helmholtz Instability (KHI). The aforementioned Alfvenic waves are associated with a strong velocity shear that can cause the development of the instability and, ultimately, the formation of a turbulent regime. The instability manifests itself in the deformation of the loop's density profile and produces small length scales in both the velocity and magnetic fields. Using a series of numerical models, we demonstrate that the growth of the KHI is sensitive to both the levels of dissipation and twist in the magnetic field. Indeed we note that the suppressive nature of resistivity and viscosity can result in an earlier onset of heating being observed in cases with lower dissipation.