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Poster

1. Fundamental physical processes and modeling

Heating effects from driven transverse and Alfven waves in coronal loops

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Recent numerical studies revealed that transverse motions of coronal loops can induce the Kelvin-Helmholtz instability. This process could be important in coronal heating because it leads to dissipation of energy at small scales. Meanwhile, small amplitude decayless oscillations in coronal loops have been discovered recently in the observations of SDO/AIA. We aim to model such oscillations in coronal loops and study wave heating effects, considering mixed Alfven and kink drivers at the bottom of the flux tubes. The transverse oscillations excited in the loop can lead to the KH instability and generate small eddies. The Alfven oscillations coming from the driver inside the loop and from the kink oscillations due to the resonant absorption around the loop boundary will have phase mixing. Both of these processes will generate small scales, which can help the dissipation of wave energy. Indeed, we can observe the increase of internal energy and temperature inside the loop. The heating is more pronounced for simulations containing the mixed driver, compared to only a kink driver. This means that the Alfven waves are efficiently dissipated in the turbulent state of the plasma. Furthermore, we also obtained forward modelling results using the FoMo code. We obtained forward models that are very similar to the observations of decayless kink oscillations. Due to the limited resolution of instruments, neither Alfven modes nor small scales are observable. Therefore, this numerical study shows that Alfven modes probably can co-exist with kink modes, leading to enhanced heating.