M48a Forward modelling of MHD kink oscillations in the solar corona

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In this work we characterise the EUV observational signatures of the MHD kink mode in the solar corona. This transverse MHD mode has been frequently observed in the solar corona and is therefore especially relevant in the context of coronal seismology. Reported damping times of kink modes are often much shorter than expected from linear MHD theory. Understanding such characteristics of MHD waves is crucial to the correct derivation of the physical properties of the plasma through application of coronal seismology. The main physical mechanism responsible for these short damping times is resonant absorption. Despite being predicted to be fairly common in the solar corona, no direct observational evidence of this mechanism exists so far. Here, we perform forward modelling of 3D MHD simulations of the MHD kink mode. The Kelvin-Helmholtz instability and the resonant absorption mechanism are two main non-linear processes obtained in the simulations. We consider line-of-sight geometric effects and instrumental effects (spatial, temporal and wavelength resolution), and determine the observational characteristics of these processes. The K-H instability can severely deform the cross-sectional shape of the tube resulting in irregular emissivity cross-sections. The main characteristic of the resonant absorption is a spectral line broadening at the front and trailing edges of the loop due to the amplitude increase of the azimuthal velocity mode. This effect is mainly observed at a perpendicular angle with respect to the oscillation direction.